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JULY, 1904. VOL. XXIV. NO. 1.

The Geographical Journal

INCLUDING THE PROCEEDINGS OF THE ROYAL GEOGRAPHICAL SOCIETY.

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The Geographical Journal.

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NOTICES.*

The Year Book.—The Year Book for 1904 is nearly ready, and can be obtained by any Fellow by applying personally or by letter to the Chief Clerk, 1, Savile Row, London, W.

Notice to Fellows in Arrears.—The Council desire to intimate that the Society's publications will not be forwarded to Fellows who are in arrears with their subscription for six months or over.

Any Fellow resident in this country, desiring to have notice of the subjects of papers to be read at the Society's Meetings forwarded to him, can receive such notices by post on payment in advance to the Chief Clerk, at 1, Savile Row, of 2s. per session.

The Society's House will remain open for the Convenience of Fellows on the evenings of the Society's ordinary meetings till 8.15. It will be closed from August 15 to September 3 inclusive.

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* See also pp. vi., viii. and x.

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The
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ADDRESS TO THE ROYAL GEOGRAPHICAL SOCIETY, 1904.*

By Sir CLEMENTS R. MARKHAM, K.C.B., F.R.S., President.

The great event of the year has been the completion of the work of our Antarctic Expedition. This is not only the most difficult and important work ever undertaken by our Society, but it is also the most successful. I propose to refer to this grand achievement at the close of my address; and in the meanwhile to place before my colleagues the activities of our Council, and the results of exploring work in other parts of the world.

But first let me remind you that we have to lament the loss of one of the few remaining pioneer explorers of Africa, one who did more than any other probably to fill the blank in Central Africa which disfigured the maps of thirty years ago. The name of Henry Stanley will ever be associated with that of Livingstone, and with that great river Congo which forms one of the most striking features on the map of Africa. From beginning to end he made a broad and deep mark on the Dark Continent; he was the first explorer to receive from this Society the recognition of a second medal.

One other death which has occurred since last I addressed you, is that of one closely connected with the work and the welfare of the Society for many years—the Hon. George Brodrick, Warden of Merton College, Oxford. His tenure of office as Vice-President and Councillor was a long one, and his judicial mind and practical common sense proved repeatedly of the greatest service when difficulties arose.

In my last address I brought to your notice, and asked your special attention to, our own urgent needs as regards house accommodation. The Council have had the question under serious consideration. The

* Read at the Anniversary Meeting, May 16, 1904.

Society continues to increase and to prosper, its numbers having reached to 4280, and the income increases proportionately. At the same time the work of the Society has so increased during the thirty years that it has occupied the present premises, that they have become much too small for its requirements. Every department of the Society is more or less congested. But the value of property has more than doubled in the last ten years. A handsome price has been offered for our house, but in addition to that sum a further large sum would be required to obtain a freehold site and erect a building worthy of the Society, suitable for its present requirements, and leaving room for expansion in the future. Several suitable sites have been offered; but to borrow the sum required would involve the Society in an extra annual expenditure, so large that the Council do not feel justified in taking any practical steps unless the bulk of the amount required, about £120,000, is subscribed either by the Fellows, or by one or more benefactors who may be convinced that our Society is rendering eminent public services. Meantime the Special Committee appointed for the purpose is to reconsider the whole question of increased accommodation, with a view of finding a solution of a practical character.

I pass from this momentous question of a new house, so difficult of satisfactory solution, to the Society's educational efforts, and here there is every reason to be satisfied with the progress that has been made during the past year. The syllabus for instruction in geography in elementary and in secondary schools, drawn up by the Society, to which I alluded in my last two annual addresses, has been widely distributed, and much sought after by teachers all over the country, in our colonies, and abroad. There is every reason to believe that the result will be one more step towards the improvement of geographical teaching. The new standard of geography aimed at in the London University Matriculation examination has also had its effect, and the results are becoming more and more satisfactory. I consider it a matter of great moment from our point of view that the directorship of the London School of Economics should have been entrusted to the Reader in Geography at Oxford, Mr. Mackinder. It is one more proof that the importance of geography, not only as a science, but in the practical affairs of men, is becoming increasingly recognized.

Fortunately, Mr. Mackinder's appointment to the School of Economics has not necessitated his retirement from his position at Oxford. The success of the Oxford School is largely due to him, and I think it would have been a misfortune if, at the present stage, it should have been deprived of his superintendence. So satisfied are the Council with the progress that has been made at Oxford under Mr. Mackinder and the other members of the staff, that they have felt justified in renewing the Society's annual grant for another five years.

In my last address I hinted that we had reason to expect that a

new departure would shortly be taken as regards the position of geography at Cambridge. That university has been more hampered for want of funds than has been the case with the sister university of Oxford. This has, to a considerable extent, affected the position of geography at Cambridge. It has hitherto obliged the Reader, Mr. Yule Oldham, to work single-handed. The third term of five years, for which the Society's grant had been continued, came to an end last June, and the question of its renewal had to be considered. I am glad to say that the Cambridge authorities showed themselves really anxious to meet the Society's views as to the position that geography should hold among the university studies. It has been decided to establish a Board of Geographical Studies, on which the Society will be represented, and to increase the annual grant to geography by the university from £50 to £200. The staff of the new geographical school at Cambridge will consist, instead of one Reader, of several lecturers and teachers, who will cover the various departments of the science. A diploma in geography will be granted as at Oxford. But Cambridge goes a step further than Oxford, by introducing geography into the examination for the B.A. degree. The importance of according geography such a position in the studies of the universities must be evident to all, and must be specially gratifying to those who, for over thirty years, have fought hard, amid much discouragement, to have geography recognized as a university subject. It will be interesting to see how the Board of Geographical Studies at Cambridge will draw up the detailed regulations for the degree and the diploma, what steps will be taken to secure a competent staff to cover the whole field of our science, and especially to train young university men for practical work in the field. We have every reason to expect that the results will prove satisfactory.

A word must be said in recognition of the valuable work being done by the Geographical Association of Teachers, under the presidency of Mr. Douglas Freshfield, with Dr. Herbertson as secretary. It is doing much to enlighten teachers with regard to the capabilities of the subject, to raise its standard, and to introduce improved methods of teaching. During the year an interesting and useful conference was held at the Chelsea Polytechnic, under the auspices of this Association, and in connection with the Conference there was an excellent exhibition of appliances used in teaching geography, the usefulness of which was increased by sending it to various provincial centres. Altogether, then, it may be said that the educational movement, as regards geography, is expanding in all directions and on satisfactory lines.

During the past year the instruction in surveying and practical astronomy has been carried on by Mr. Reeves with marked success, and altogether sixty students have passed through his hands. Although most of these could only spare time for the more elementary work, yet

twelve have gone through the complete course, and have obtained the Society's diploma after passing an examination before the Diploma Committee. This number of successful candidates is considerably in excess of any previous year, and is a clear indication of the increasing interest in the subjects that are taught, as well as of the thoroughness and practical nature of the instruction given. Most of those who have received our Diploma, during the past year, are already holding important positions as geographical surveyors in various parts of the world. Altogether this course of instruction given by Mr. Reeves must be considered a most important department of the Society's work, and one that is yielding excellent results.

In my last address I explained how my scheme for afternoon meetings on technical subjects, which was commenced in 1894, had been developed into a regular department of the Society's work, directed by a Research Committee, whose members are taken from the List of Referees. During the present session the Research Department has held several meetings, when matters of much scientific interest were considered and discussed. One important investigation has been initiated, namely, the changes which have taken place in the river-courses and on the north sea-coast region of England during the historical period, an investigation involving varied minute research, but sure to yield interesting results.

At one of the meetings a most interesting discussion took place on the question of the desiccation of Central Asia, introduced by Prince Kropotkin; at another there was a discussion on suggestions for systematizing geography, made by Dr. Herbertson. Sir John Murray, and several members of his staff engaged in sounding the Scotch lakes, gave the results of investigations of various phenomena in Loch Ness. At the suggestion of Mr. Francis Galton, a small committee has been appointed to consider the construction of perspective maps on scientific principles. Dr. Mill has brought before the committee a new system of nomenclature for the physical features of England and Wales. The proposed names have been carefully considered by a special committee, and, although difficulties have arisen, we hope soon to be able to publish a physical map of England and Wales, with all the great features suitably named. Another interesting contrivance brought before the committee was a flat model which solves problems in the use of the globes, by Prof. Everett.

Such are some of the directions in which the Research Department has been working during the year. One result has been to show that geography is as much adapted to be an implement of research as any other department of science.

The International Geographical Congress, which we passed on to our friends at Berlin in 1899, will this year be undertaken by our American cousins at Washington, to whom we confidently wish all possible success. At the special request of the Organizing Committee,

this Society will be represented by ten delegates. As the Congress will meet at New York, Philadelphia, and St. Louis, as well as at Washington, it is likely to be one of special interest.

I pass now to the main features of the exploring work of the year. It was with great regret that we heard of the loss of our valued associate Baron Toll and his companions. They had undertaken to discover and explore any land to the north of the New Siberia Islands; but they have long been missing. Diligent search will be made in every likely quarter, but it is to be feared that little hope can be entertained. Baron Toll was an able and accomplished scientific explorer, and had been at work on the Siberian coasts and seas, at intervals, for over twenty years. We sympathize with our Russian colleagues in the loss of this eminent geographer. Many also, in this country, who knew Admiral Makaroff, the inventor of the ice-breaker which he himself tried in the Arctic Regions, will regret that the fortune of war has led to the loss of an accomplished naval officer, an able inventor, and a genial friend.

The great geographical interest of the year, as regards Asia, centres in the mysterious land of Tibet. Prevented from free access to the country of the lamas, it has been the business of this Society and of the kindred Hakluyt Society to collect and arrange all previous information for the use of explorers who would penetrate into the country in the fulness of time. Sir Henry Yule, in his valuable work 'Cathay and the Way thither,' published by the Hakluyt Society in 1866, made known to us the journeys of Friar Odoric of Pordenone, the first visitor to Lhasa. I am happy to be able to announce that M. Cordier, the President of the French Geographical Society, has consented to prepare for us a second edition of 'Cathay and the Way thither,' which has long been out of print. We shall have the pleasure of welcoming M. Cordier this evening.

Our subsequent knowledge, down to the middle of the last century, was based on the maps drawn by two lamas who had received instruction from the Jesuit Father Regis at Peking. These maps were finished in 1717, and published by Du Halde. They can be consulted in our map-room. To this day the lama survey is the basis of our geographical knowledge, with corrections by the pundits of the Indian Survey Department and others.

It was due to the enlightened policy of Warren Hastings that friendly relations with Tibet were established, but his able and intelligent envoys were not surveyors. In 1875 I was entrusted with manuscripts of Mr. Bogle, the envoy of Warren Hastings, and of Mr. Manning, the only Englishman who has ever visited Lhasa, with a view to publication. The result was my volume entitled 'Missions to Tibet,' which contains the narratives of Bogle and Manning. In an introduction I brought all existing information together down to 1875, and there was a second edition in 1879. My great object was to supply information which would be useful when the wise policy of Warren

Hastings was resumed. In 1885 there was an intention of sending a mission to Tibet under Mr. Colman Macaulay, with whom I corresponded until the intention was unaccountably abandoned.

In my address of 1896 I drew attention to the importance of exploring the great northern range of the Himalaya from Kailas to the Goring-la of Littledale, and I got together all available information on the subject. But this is work which still remains to be done. The Society's last contribution to a knowledge of Tibet has been the publication of the journey to Lhasa and Central Tibet by Sarat Chandra Das, edited by the Hon. W. W. Rockhill.

Meanwhile the Imperial Russian Geographical Society has been more successful in collecting information. Mr. Oldenbourg, of the Academy of Science of St. Petersburg, and our colleague Mr. Gregorief, have prepared a list of all the travellers who have described Lhasa, and a bibliography of their works. There are upwards of twenty. The literature of Tibet itself has received attention from our Russian colleagues. The Buriat Lama Tsibikoff, who has taken a degree with honours at the university of St. Petersburg, was sent to Lhasa, commissioned by the Imperial Russian Geographical Society, and recently returned to St. Petersburg, bringing back descriptions of the route and of the Tibetan capital, and a library of Tibetan books in 319 volumes, containing 122,000 sheets of printed matter, including Tibetan history, geography, astronomy, astrology, magics, and religious works of the most renowned lamas of the last nine centuries. These books were printed at Lhasa from old wood blocks.

A series of fifty photographs were also taken in 1900 and 1901, on behalf of the Imperial Geographical Society, by M. Oushe Norzunoff, a Calmuck of the Astrakhan Horde, and M. Tsibikoff, a Kori Buriat already mentioned. They include views of the palace of Potala, of Lhasa, of the great monasteries, of Gyantse and Teshu Lumbo, of the Kichu—the river of Lhasa, and of the Yamdok or Palti lake. M. Semenoff has presented us with a complete set of these photographs, with a descriptive list in English by M. Gregorieff, for which we have returned our most cordial thanks for the great courtesy and kindness of our Russian colleagues. The photographs cannot fail to be of great interest to the Fellows of this Society.

At length, in the fulness of time, a mission, with an escort, has been sent to Tibet by Lord Curzon of Kedleston; and the wise measure of Warren Hastings has been resumed by the ablest of his successors. Our Gold Medallist, Colonel Younghusband, has received charge of the mission. It is a great pleasure to me to hear from our colleague that my book—'Missions to Tibet'—is useful, and that two copies of it are with the mission. The mission, with its military escort, has already gone over much interesting ground, and has nearly reached the Yamdok lake. Colonel Younghusband tells me that neither people nor country

have altered since the days of Bogle and Manning, except that now the Chinese have less power. The mission is accompanied by two excellent surveyors—Captain Ryder, R.E., and Captain Cowie, R.E., and good surveying work has already been done, and will continue to be done. We shall have a really good map of all the ground traversed by the mission; and we must earnestly trust that Lhasa, with the valley of the Kichu, and all the upper valley of the Tsanpu, will be included. It was most desirable that the leader of a mission of such vast importance should be a geographer as well as a diplomatist, and no better qualified officer for such a service could be found than our Gold Medallist, Colonel Younghusband.

The Society has received from Dr. Merzbacher, the distinguished Central Asian explorer, a long preliminary account of his two years' exploration of the Tian Shan region, which will be published in the *Journal*, and is of great geographical interest.

We have also received an account of an expedition into Eastern Tibet, partly supported by the Society, by two young officers, Captains Rawling and Hargreaves, who have done some excellent surveying work.

In Africa the most important work of the year has been done by Captain Lenfant, whom we were glad to welcome on the shores of England, on his return from Nigeria. Captain Lenfant was well known before for the excellent work he did on the Niger. During his last expedition he practically solved the important hydrographical problem of the exact relations between the tributaries of the Benue and the Shari, which flows into Lake Chad. He has shown that, at certain seasons at least, it would be possible to go by water from the Atlantic, up the Niger and Benue, and down the Shari to Lake Chad. He, and other French officers, have made important contributions to our knowledge of the conformation and *régime* of that curious lake. Another French explorer, M. Chevalier, has just returned after doing much good work at the source of the Shari, and on the borders of Darfur and Wadai.

Two delimitation commissions have been at work in the Nigeria region, which have no doubt contributed considerably to a more precise knowledge of the country through which they have passed. In one of these, dealing with the Anglo-French boundary, Colonel Elliot was the leader of the British party, and we hope to hear from him, at an early date, some of the results of his operations. On the other side the Anglo-German Commission has been working out the boundary between the two spheres, and we may hope that the British officer on that commission, Colonel Jackson, now on his way home, will also favour the Society with an account of some of the geographical results of that expedition. In the same region a well-equipped party, with instruments furnished by the Society, has recently started on a two

years' exploration. It is under the leadership of Lieut. Boyd Alexander, who proposes to proceed eastwards, mapping, observing, and collecting as he goes. Very important and varied results may be expected. On the eastern side of Africa, Major Delmé Radcliffe, the British representative in the expedition to delimit the boundary between the British and German territory west of Victoria Nyanza, has completed his work, and is now, I believe, carrying on further delimitations to the east of the lake.

All these labours are bound to lead to important contributions to a more exact knowledge of the geography of Africa. During the session we have had from Captain Maud some valuable information respecting the country traversed by him on Mr. Butter's expedition along the southern borders of Abyssinia. Other similar expeditions are at work on the Anglo-Portuguese boundary to the north of the Zambesi and elsewhere; while the great geodetic expedition through Central Africa is actively pursuing its important enterprise. Thus in time we shall have a series of trustworthy astronomically observed points which will enable us to map the interior of Africa with much more precision than has hitherto been the case.

In South America very important geographical work has been achieved under the direction of their Committee of Fluvial Highways by the Peruvian Government, and by the Arbitration Commission in the Patagonian Andes. Accounts have been given in our *Journal*, from time to time, of the activity of the Bolivians in exploring the more navigable courses of the tributaries of the great river Beni. But there remained some of the upper courses, especially of the Tambopata and Ynambari, which were unexplored. These have now been discovered and mapped by expeditions led by Villalta, Cipriani, and others whose work is exceedingly meritorious. The region is one of exceptional interest, because it contains those historical valleys on the eastern slopes of the Andes which are connected, by many ties and many reminiscences, with Cuzco, the sacred city of the Incas. It is one of vast importance, because it leads to a most valuable India rubber yielding region of immense extent. Colonel Church has contributed a very able and complete narrative of this Peruvian exploring work to the May number of our *Journal*, which will be found to be well worth careful perusal.

Since the last anniversary meeting, the work of the British arbitration commission appointed to demarcate the boundary, which had been the subject of a long-standing dispute between the South American republics of Argentina and Chile, has concluded its work. It will be remembered that early in 1902 one of our Vice-Presidents, Sir Thomas Holdich, with a party of officers who all had trained experience as surveyors, and who were all Fellows of this Society, was deputed, as a member of the Arbitration Tribunal, to examine into the geographical condition of the southern Andine country in Patagonia, in order to

determine certain facts which bore closely on the solution of the difficult problems which beset the principles of arbitration as laid down in the treaties between the two states. Within the short space of a few months, in the autumn season in those southern regions, the examination of the coast configuration of Chile, and of the structure of the great mountain mass through which many of the chief rivers of Patagonia make their way to the Pacific, was successfully accomplished.

The evidence thus obtained was laid before the Arbitration Tribunal, and proved to be a sufficient basis for framing an award, which was given by King Edward VII. in the course of the same year. At the joint request of the two governments concerned, the services of the same party were subsequently placed at their disposal for the demarcation of the boundary determined under the award. The boundary extends through about 900 miles of rough and only partially surveyed mountain territory, constituting the Andine region of the Patagonian lake districts. The demarcation was effected during the southern summer months of 1902 and 1903, but the final maps and results were not submitted until last August, when the last chapter in this long story of international dispute was happily closed. When we remember the long years of most dangerous unrest which the undetermined boundary produced, the drag which it put on the progress of commercial development in those two rising states, the enormous cost of those preparations in ships and war material which was necessitated by the constant fear of an outbreak of hostilities between them, and last, not least, the peril which hung over the vast financial interests possessed by England in South America, we may well congratulate ourselves that we, as a Society, have contributed our share towards the evolution of a good understanding and a peaceful issue to the negotiations, which appear to possess every chance of permanency.

Since that boundary has been laid down throughout its long extent, winding over the crests of rugged sierras, and plunging into depths of forest-girt depressions, here setting a barrier of snow-crested impassable mountains between the two states, there stretching across the undulating grass-covered moraines and terraces of a former system of glacial lakes, everywhere presenting a recognizable limit to the territories appertaining to either of them, we have heard nothing from the two republics of the south but assurances of intense satisfaction that the danger has passed. On either sides of the Andes the two governments have applied themselves with earnest determination to the development of the vast natural resources which seem to be the heritage of all South America. Much geographical information of absorbing interest has been added to the store of the world's knowledge. The scientific leaders of thought and action have been brought into closer communion. That mutual bond of sympathy which is never wanting between geographers of all countries has been strengthened.

We may reasonably hope that, extending far beyond the limits of geographical brotherhood, there is now, and always will be, a well-grounded assurance of international friendship between these great and rising republics of South America and ourselves. It is based on the successful issue of this appeal from them to the decision of our peace-loving king, and of his answer to that appeal.

In turning to our great work in the Antarctic Regions, we are at once reminded of the cordial co-operation of the Argentine Government and people. Our main object was geographical discovery and exploration; but magnetic observations held an important place among our objects, and arrangements were made for such a combination of observations over the southern hemisphere chiefly, as had never before been attempted. The plan arranged with the magnetic observatory at Potsdam had for its object to procure a series of synoptic charts which will allow of the variations in the magnetic condition of the whole Earth being traced in detail during a definite period, and so to provide the necessary basis from which alone the fundamental problems of terrestrial magnetism may be more clearly approached. The observations were to be made simultaneously over the entire globe, consisting of observations of the three elements at intervals of an hour on fixed term days; and detailed observations of the three elements during a specified hour on each term day. Forms and instructions, supplied from Potsdam, were translated and sent to the observatories. These were at Bombay, Mauritius, Christ Church in New Zealand, Melbourne, Falmouth, Kew, and on board the exploring ships.

While these details were in course of arrangement, my friend Don Francisco Moreno came to me and proposed that I, in concert with Baron Richthofen and the German Committee, should request the Argentine Government to establish another magnetic station. We were met with a cordial assent. It was resolved to establish an observatory at Año-nuevo Island, off Statan Island; and Lieut. Horacio Ballvé, an able and intelligent officer, was appointed to procure the instruments in Europe, and to take charge of it. Sir Thomas Holdich had the opportunity of visiting the Argentine magnetic station, and was struck with the thoroughly workmanlike efficiency of all the arrangements, the excellence of the instruments, and the devotion to duty evinced by those who were destined to spend many months of the year on a small and storm-swept island, far away from the amenities of civilization, on work of purely scientific investigation. Simultaneous observations over the world have never been undertaken on the same scale, and they will supplement, to a very important extent, the elaborate work on board the *Discovery*. In this magnetic work the German and English expeditions have been able to co-operate. We now have simultaneous observations on both sides of the south magnetic pole, and at no great distance from it, which will probably enable magneticians

to fix its position with accuracy, while Captain Scott has crossed the line of no variation.

As regards Antarctic exploration, there have been three expeditions which have worked on the Antarctic circle and its neighbourhood; and one which has penetrated far to the south, to examine and solve the geographical problems of the Antarctic regions.

Dr. Nordenskiöld's enterprise, owing to his sojourn having extended over two complete years, and for other reasons, appears to have secured the most important results of the three expeditions which remained on the threshold of the unknown south. His discovery of a Jurassic and a Miocene fossil flora in the South Shetland Islands, and of fossil bones of mammals, possibly points to a connection of these islands and of Graham Island with South America. This discovery is the main result of Dr. Nordenskiöld's visit to the South Shetlands. He has recently given us a most interesting account of his expedition, and of the perils of the crew of his ship the *Antarctic*, owing to her loss in the ice. When Dr. Nordenskiöld did not return in 1902, it was feared that there had been some disaster, and the Argentine Government promptly and generously came to the rescue.

A year ago Lieut. Julian Irizar, a young Argentine naval officer, who was the naval *attaché* in London, came to me for advice, as he had been ordered to fit out and command a vessel to be sent for the relief of Dr. Nordenskiöld. We talked the matter over, and I put him in the hands of Mr. Ernest Shackleton and Mr. Cyril Longhurst, our Antarctic secretary, for there was no one in this country who knew so much about fitting out an Antarctic ship as they did. He also went to Norway, and got sledge equipment under the guidance of our associate, Mr. Crichton Somerville. Fully provided, he proceeded to Buenos Ayres, took command of the gunboat *Uruguay*, sailed in October, and by the middle of November he had picked up Dr. Nordenskiöld and his party on one island, the shipwrecked crew of the *Antarctica* on another, collections of fossils on another, and brought all safe back to Buenos Ayres. Lieut. Irizar's relief voyage was such a smart piece of work, and his narrative is so modest and straightforward, that I have translated it for the May number of our *Journal*. This gallant young officer of the Argentine navy has received to-day at our hands, the public recognition of his skill and enterprise in executing this rescue work so promptly and so well. The incident is perhaps significant of the position which the Argentine navy may hereafter assume amongst the navies of the world. Polar exploration is a noble ambition among naval men, and Argentina, in the persons of Irizar and Sobral, already boasts of Antarctic naval officers.

There is a very useful piece of Antarctic work to be done, which seems specially to belong to the Argentine Navy, namely, the circumnavigation or circumambulation of the southern half of Graham Island.

I trust that before very long an Argentine naval officer will be leading a well-equipped Argentine expedition to the southern extremity of Graham Island.

Mr. Bruce, as I anticipated in my address last year, found no land in the Weddell Sea north of the point reached by Sir James Ross in 1843. Mr. Bruce entered the pack on February 2, took several soundings, and found a uniform depth of 2500 fathoms, between 61° and 70° S. He wintered at the South Orkney Islands, and is now on his way back to Scotland.

Dr. Drygalski was so good as to come from Germany to give us an account of his expedition. Leaving Kerguelen Island in the end of January, the *Gauss* was steered eastward of south, but was stopped by land before crossing the Antarctic circle. This land consists of a volcanic hill named Gaussberg, and some ice-cliffs, the whole receiving the name of Kaiser Wilhelm Land. The *Gauss* wintered on a comparatively shallow bank about 50 miles north of Gaussberg, and it is considered that this was a specially favourable position for making biological collections. The meteorological series of observations will be valuable, and the magnetic observations, taken in co-operation with the other stations and with the English Expedition, have special value. When the ice broke up in the summer, the *Gauss* returned by way of the Cape.

Theorists seem to wish to connect Gaussberg with Kemp Land to the westward by a continuous coast-line; but the facts, so far as has been ascertained, are against them. The distance from the Gaussberg of Drygalski to Kemp Land is over 700 miles. The only vessel that has crossed the Antarctic circle on those meridians is the *Challenger* on February 16, 1874. She went 10 miles south of the circle, and was in 66° 40′ S. and 78° 22′ E. We learn from the *Challenger* narrative, that there was no pack-ice, a clear sky to the south, and that land of any elevation would have been seen at a distance of 50 or 60 miles. "To the eastward of the meridian of 92° E. icebergs were very numerous. Their absence further to the westward, between 70° and 80° E. long., except when close to the pack-edge, was so marked that, coupled with their absence on the same meridians in lower latitudes as shown by the ice-chart, it seems to indicate that there can be no land for a considerable distance south in that neighbourhood, and that a very high latitude could be gained there if desired."

This is conclusive so far as it goes, and points to one route by which the Antarctic Regions may be penetrated. I explained this in my "Plan of Operations." For our idea of Antarctic exploration was not to stop about the circle, but to force a way through the pack and penetrate far to the south, so as to learn the secrets of the vast unknown area. I looked upon the route pointed out in the *Challenger* narrative as the second best, and I thought that the German Expedition would take it.

The best route was to follow in the track of Sir James Ross, and to attempt the solution of the various geographical problems which were the outcome of his discoveries. The old sailing bomb ships did not enable Ross to approach the coast very closely, nor to land except on small islands. But he delineated the lofty mountain range which it was for another to explore; he saw the great active volcano which it was for his successor to examine; he reported the wonderful ice-barrier which others were, when the time was ripe, to land upon and explore, and he thought he saw signs of the eastward land which his successor was to discover.

Captain Scott's instructions were to achieve all these great and difficult services, and thus to crown and complete the work of his illustrious predecessor by facing greater hardships, by overcoming far more formidable obstacles, and by the endurance of a much longer period of Antarctic rigour. It is Scott's great merit that he not only carried out these instructions thoroughly and completely, but that he and his gallant companions have accomplished far more than was expected from them. It is my desire that all their names should be recorded here, for all have contributed to the great success.* Those of Ernest Shackleton, who so gallantly assisted Scott in his great southern journey until he broke down, and of William Macfarlane, who was also invalided, are fully remembered with the rest.

We must wait until the return of the expedition for a complete account of the work done, and of the conclusions derived from the scientific results. We have only received an outline—how, in the navigable season of 1902, the great ice-barrier was examined, its

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* *Captain*—Robert F. Scott, R.N., M.V.O., F.R.G.S.
Lieuts.—Albert B. Armitage, R.N.R.
Charles R. Royds, R.N., F.R.G.S.
Michael Barne, R.N.
Sub-Lieut.—George F. A. Mulock, R.N., F.R.G.S.
Eng.-Lieut.—Reginald Skelton, R.N.
Surgeons—Reginald Koettlitz.
Edward Wilson, M.B.
Physicist—Lewis C. Bernacchi, F.R.G.S.
Biologist—J. V. Hodgson.
Geologist—H. J. Ferrar.
Assistant Engineer—J. H. Dellbridge, R.N.
Boatswain—J. A. Feather, R.N.
Carpenter—F. C. Dailey, R.N.
Steward—C. R. Ford, R.N.
Petty Officers—Edgar Evans, R.N.
David S. Allen, R.N.
Jacob Cross, R.N.
Thomas Kennar, R.N.
William Smythe, R.N.
Stokers—Arthur E. Quartly, R.N.
William Lashly, R.N.
Thomas Whitfield, R.N.
Frank Plumley, R.N.
Able Seamen—Thomas Crean, R.N.
George B. Croucher, R.N.
James W. Dell, R.N.
Jesse Handsley, R.N.
W. L. Heald, R.N.
Herbert Joyce, R.N.
Arthur Pilbeam, R.N.
Frank Wild, R.N.
T. S. Williamson, R.N.
W. J. Weller.
Marines—Corporal Blissitt, R.M.
Private G. Scott, R.M.
Cook—J. Hancock.
Cook's Mate—Charles Clarke.

†

Able Seaman—George T. Vince, R.N.
Lost his life, March 11, 1902.

character investigated, and a line of soundings taken along its face; how King Edward VII. Land was discovered to the eastward; and how an excellent wintering-place was found as the base of subsequent operations on land. We know how invaluable observations were taken, and collections made during two long winters of darkness and hardships in 77° 50′ S. We know how the sledge parties achieved magnificent results during the two working seasons; how Scott himself, with two companions, reached a latitude of 82° 17′ S., and saw a mountain range extending to 83° S.; how exploration was systematically carried on by other sledge parties in various directions; how in the second season Scott made a journey into the interior for a distance of 270 miles, crossed the meridian of no variation, and discovered a fossil flora; how another party went south to 80° to examine a great inlet sighted during the previous season; and how a third party traversed the great barrier for 155 miles, examined its character, and took a uniform series of magnetic observations. We know how Captain Scott succeeded in getting the *Discovery* out of the ice, and that he did much more geographical work in his second navigable season before returning to Lyttelton. We further know that this magnificent tale of work could not have been achieved without rare qualities on the part of the leader, and zealous co-operation on the part of officers and men, as well as good fellowship among the whole gallant band.

> "By mutual confidence and mutual aid,
> Great deeds were done and great discoveries made;
> The wise new prudence from the wise acquire,
> And one brave hero fans another's fire."

But we only know these things in bare outline. We await the return of our friends before we can hear the whole glorious story in detail.

I believe that the great success is due to the command being entrusted to a young naval officer in the regular line, supported by thirty naval officers and men, zealously devoted to duty, and resolved to uphold the credit of their noble profession in the far south. The navy assuredly has cause to be proud of their exploring detachment, which has been spared by the Admiralty for a most important service.

The Council resolved that Captain Scott had won the Patron's Medal for his memorable sledge journey to 82° 17′ S. alone, and his Majesty the King has approved the choice. Scott's equally important inland journey, during the second season, was not then known. It more than doubles the strength of his claim. But it was felt that these journeys only represent a fraction of our colleague's merits. His conduct of the expedition, the preservation of its well-being for so long a period under most trying circumstances, and his high qualities for command, deserved some special recognition. The Council has decided on presenting Captain Scott with a gold medal commemorative of the expedition, with replicas in silver for the officers and men.

The thanks of the two Societies are due to the Lords of the Admiralty. When I saw Mr. Goschen in November, 1896, he said that though the Government could not send an expedition, he assured me that the Lords of the Admiralty would take an interest in the enterprise, and would lend instruments. Their Lordships have ever since taken a great interest, have always considered our requests favourably, and have complied with them whenever it was possible. When, on April 6, 1900, Mr. Goschen promised to lend two excellent officers to the expedition, who proved to be Commander Scott and Lieut. Royds, I felt that success was secured. But the assistance from their Lordships did not end there. Commander Scott obtained from them almost everything he wanted, both as regards officers and men; so that now, out of thirty-eight, there are thirty naval officers and men on board the *Discovery*. To this the great success of the expedition is mainly due, and our most cordial thanks should be offered to the Lords of the Admiralty.

Next we are bound to offer the thanks of the Society to Captain Colbeck and his officers and crew, for the admirable way in which they have conducted the relief work. When, on September 18, 1901, in company with Captain Colbeck, I surveyed the *Morning* at Tonsberg, and concluded a bargain with her owner, I felt that we had secured the strongest ship and the best commander. His first voyage was by far the most important, because he then discovered the position of the *Discovery* and brought her relief. In the second voyage he knew the exact route to take. He conducted it with the same skill and judgment, while it was a much more open season. Besides his pre-eminence as an Antarctic ice-navigator, and his staunch loyalty to the expedition and to the Society, Captain Colbeck deserves great praise for his wise selection of officers, and for the respectability as well as zeal of his crew. The names should not be passed over, and I wish to record them in my address.* The Council has resolved to mark their

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* *Captain*—Lieut. William Colbeck, R.N.R., F.R.G.S.
Chief Officer—Rupert England.
Second Officer—Lieut. Edward R. G. Evans, R.N., F.R.G.S.
Third Officer—Gerald S. Doorly, R.N.R.
Mids.—Neville Pepper.
Maitland Somerville.
Engineer—J. O. Morrison.
Surgeon—G. A. Davidson, M.B.
Boatswain—A. Cheetham, R.N.R.
Carpenter—G. Bilsby.
Steward—J. Sullivan.
Sailmaker—G. W. Rolfe.
Boatswain's Mate—J. S. Good.
Steward's Assistant—J. A. Chester.
Able Seamen—A. Casement, R.N.R.
Owen Riley.
Cook—John H. Maxwell. *Second voyage only.*
Able Seamen—F. W. Burton.
G. R. W. Leary.
W. W. Hender.
L. Burgess, R.N.R. (*Russian medal for saving life*).
James Paton.
R. A. Beaumont, Herbert D. Jarvis, W. E. Knowles. *Second voyage only.*
Second Engineer—Walter J. Marsh. *Second voyage only.*
Firemen—F. W. Kempe.
David Nelson, John S. Partridge. *Second voyage only.*

appreciation of Captain Colbeck's excellent services by presenting him with a specially designed piece of plate. The good conduct of his crew reflects credit on the mercantile marine.

To the Government and people of New Zealand a great debt of gratitude is due. When we were in our greatest difficulty about despatching the relief ship in 1902, the Government of New Zealand generously came forward with a subscription of £1000. Nothing can equal the hospitality and kindness of the people of Christ Church and Lyttelton, their desire to help the expedition in every possible way, and the interest they have taken in its welfare.

I know that I speak in the names of all the officers and men of the *Discovery* and *Morning* and their relations, and of every one who has in any way been connected with the expedition, when I express our thanks to our indefatigable Antarctic Secretary, Mr. Cyril Longhurst. Arranging the archives in apple-pie order, keeping the intricate wages accounts, conducting official correspondence, looking after our business of all kinds, Mr. Longhurst has been indispensable, and has worked hard and zealously for five years. Always anxious to keep the relations informed, always prompt to oblige any one connected with the expedition, always willing and ready with help or advice, we all feel that the business and the work would have been very different without our secretary, equally the staunch friend of all, from the captain to the cook's mate. The expedition has been fortunate in many things, in none more than in the acquisition of Cyril Longhurst as its secretary.

We now look forward to the happy return of the *Discovery* in the autumn. Our arrangements respecting the collections are satisfactory, for the Trustees of the British Museum have undertaken to organize and publish the biological and geological results. The magnetic work will be undertaken by a Committee of the Royal Society, and our Council has undertaken the expenses connected with the meteorological observations. We shall all, indeed, all England will, unite in welcoming our Antarctic heroes, who have done so much to uphold the credit of their country. There will be the ceremony of presenting Captain Scott with the special gold medal, and Captain Colbeck with the Council's present. I hope also to have a second meeting of experts to discuss the various problems which the work of the explorers have helped to solve.

In conclusion, I would say that, if the opinion of one who has served in a polar expedition, and has studied polar work for half a century with close attention, may be stated, this is the best-conducted and the most successful expedition that has ever entered the polar regions, Arctic or Antarctic.

THE NATIONAL ANTARCTIC EXPEDITION.*

By Commander ROBERT F. SCOTT, R.N.

Summary of Proceedings.

The following report of the work of the National Antarctic Expedition from March, 1903, dated "*Discovery*, Auckland island, March 23, 1904," has been forwarded by Commander Robert F. Scott, R.N., to the Presidents of the Royal and Royal Geographical Societies, and is published here with their sanction :—

"My report of proceedings forwarded by the *Morning* in 1903 was intended to amplify the telegram despatched at the same time. I understand the latter was altered out of all recognition by Reuter's Agency, and therefore fear the report must have been somewhat obscure in places. I trust it is understood that these reports purport merely to outline the movements and work of the various members of the expedition. I purposely refrain from such matters as the results of scientific observation and investigation, preferring to leave these to the reports of the various officers specially concerned in them.

"The winter closed in very rapidly after the departure of the *Morning* on March 2, 1903, temperatures fell, and the weather became gloomy, but there was little snow. Some ice broke away, but the open water never came nearer than within 4 or 5 miles of the ship. The month of March was occupied principally in laying in a store of seal-meat and flesh of skua gulls for winter consumption. Fish-traps were also set, but though at first these were very successful, they soon ceased to provide any substantial addition to our fare. The articles supplied to us by the *Morning* consisted principally of tinned vegetables, soups, sauces, herbs, pickles, and bottled fruits. They were not absolutely essential, but they greatly added to our comfort. Of such necessaries as biscuits, flour, oatmeal, and sugar we had an ample supply, and from this time we ceased altogether to use tinned meats.

"When April came without change in the ice-conditions, we were forced to abandon all hope that the ship would be free. The *Discovery* had been prepared for sea, but she was now again dismantled. The winter awning was spread, and snow was placed on the decks. We soon came to understand that our second winter was likely to be far pleasanter than the first. Experience suggested numerous ways in which the material comfort of the living-quarters could be improved. The men were in excellent spirits, much exercise was taken, and games of hockey continued until the light failed. But the greatest advances were made in respect to the food and light. It was only after his

* An adequate map, showing the exploring work of the expedition during the two years, will be published in the August *Journal*.

departure that I fully appreciated how far our wretched cook had gone in spoiling the food. Under new arrangements, the food was always appetizing, and though seal-meat was the principal fare, all hands partook of it, and continued to enjoy it thoroughly.

"The light provided throughout the second winter was acetylene gas. A stock of calcium carbide had been obtained for the hut, and this was now brought into use with a single burner in each compartment of the living space. The light was brilliant, and had a most happy effect on the comfort of the community. This beautiful illuminant is in every respect excellently adapted for use in a polar winter. Generally speaking, we had less wind in the early winter of 1903 than in the corresponding season of 1902, but in the latter months of 1903 the wind increased considerably, so that the averages for the two seasons differ but little. The temperatures during the latter season have been far lower. I have already remarked that the *Discovery* lay in a most sheltered spot. The difference in temperature between a thermometer in the screen and one placed 1½ mile to the south was rarely less than 10°. It was in this outer position, in the month of May, that we read the low temperature of – 67°·7. From this time the temperature rose until it again fell in the spring. We had no heavy gale or snowfall until the second week in June, when a heavy southerly blizzard again buried the ship in drift. We had not sufficient photographic paper to get a complete record with the Eschenhagen instruments throughout the second season, but Mr. Bernacchi used such paper as remained to obtain records of the most interesting periods. In all other respects, the routine of observations was maintained as during the first season.

"Ample employment for the men was found in preparing for the spring sledging. This involved much repairing and renewing and some change in design of the equipment. In drawing out plans for the coming sledging season, I thought it wise to fix its conclusion at a comparatively early date, in order that all hands might be available to assist in releasing the ship should the opportunity occur. The date fixed was December 15, as at this time, in 1902, the open water was within 9 or 10 miles of the ship. In arranging the extended journey, I was confident that without dogs it would be useless to attempt to penetrate further to the south. My experience of the barrier surface and some arithmetic convinced me that a party of men could not hope to reach beyond the farthest point of the previous year, however amply supported. The actual performance of the southern parties completely justified this view. Our course of the previous year had taken us well clear of the land to the south-west; but there remained many points of interest in connection with the junction between the barrier and the land, and especially in connection with some apparent straits which intersected the coastal mountains, and which we had only viewed at a great distance. In the second place, we did not know what lay to the

south-eastward. We imagined the barrier to extend almost indefinitely in that direction, but we had no proof. Finally, I thought it possible, with the help of experience, to penetrate considerably further to the westward over the ice-cap of Victoria Land. Our small complement only admitted of two properly supported journeys and one unsupported journey. I decided that the supported journeys should be to the south-west and west, the unsupported to the south-east. The latter was entrusted to Lieut. Royds, the south-west journey to Lieut. Barne, and I arranged to lead the western party myself.

"The winter passed away with extraordinary rapidity, and without a single case of sickness. With the spring, the whole ship became very busy with immediate preparations for the sledging. The first spring journey was started on September 7, the party consisting of Lieut. Royds, Dr. Wilson, Cross, Whitfield, Williamson, and Blissitt. The object of the party was to visit the emperor penguin rookery, near Cape Crozier, and it was timed to hit off the period of incubation. In this the expedition failed, for these extraordinary birds appear to breed in the coldest and darkest months of the year; but, by a fortunate circumstance, they succeeded in procuring a number of deserted eggs. Dr. Wilson was able to take a number of notes, and the party brought back two live chicks, to which Cross sacrificed his sleeping-jacket, though the temperature was continually below $-50°$, and at lowest $-62°$. The party reached the ship on September 17.

"Lieut. Barne left the ship on September 12, placed a depôt to the south, and returned on September 20. His party included Lieut. Mulock, Quartly, Smythe, Crean, and Joyce. They experienced the lowest temperature for a sledging party on record, the thermometer remaining almost continuously below $-60°$, and registering as low as $-68°$. Under these very severe conditions there was only one very severe frost-bite. This was one of Joyce's feet, which on two occasions had to be nursed back to life for more than an hour.

"The western party of last year spent considerable time in crossing a range of foothills 4000 feet in height. I thought it possible to avoid this, and started on September 9 to find a new route and establish a depôt. The party included Mr. Skelton, Mr. Dailey, Evans, Lashly, and Handsley. We found an easy road up a glacier, and placed the depôt at a height of 2000 feet, 60 miles from the ship. Returning from this point in three and a half days, we regained the ship on September 20. We were to some extent sheltered from the extreme cold encountered by the other parties, but the temperature was frequently below $-50°$, and at lowest $-59°{\cdot}5$. I have mentioned these temperatures, because I believe they are almost, if not quite, without precedent in polar travel, and they therefore afford the best possible proof of the excellent state of health of the ship's company.

"The extended south-western journey was started on October 6; the

main party consisted of those persons who had laid the depôt, and the supporting party was in charge of Mr. Dellbridge, and included Wild, Heald, Allen, Pilbeam, and Croucher. Mr. Barne had also the depôt laid by himself, and some food remaining at depôt (A) from the previous season. The party was most unfortunate in experiencing an almost continuous south-westerly wind, with drift and snow, against which they could only march with difficulty over a wretched surface. The supporting party turned on October 28, and the main party, after a continuous struggle, reached the mouth of the strait in lat. 80° S. on November 14. They advanced a short way inside the strait, but were continuously headed off by ice-disturbances. On November 22 they turned, and, keeping as close as possible to the coast-line, they made their way homeward, arriving at the ship on December 13. The whole party showed evidence of their hard work. Mr. Barne and Quartly were somewhat overstrained, and the latter was placed on the sick list for a short time. The party was unfortunate in failing to penetrate further into the straits, as I had hoped they would; but their observations on the ice-disturbances, the finding of a lateral moraine of huge granite boulders, and other evidences, prove that the strait contains an immense glacier, one of the most important feeders of the barrier, and it shows indirectly the great extent of the land ice-cap to the westward of this position. One of the most important facts discovered on this journey was the movement of depôt A. The fact admits of no doubt, as the depôt was established on the line of transit of two well-defined peaks. It was found to have moved a distance of 608 yards across the line. This is the only definite measurement of a barrier movement we have obtained. It may be difficult to understand how vast all these ice-problems are to a sledge party endeavouring to solve them. Once amongst the disturbed ice, it may take days to reach a point but a few miles distant. Meanwhile, the party is repeatedly plunged into hollows, where they can see nothing, and the greatest care has to be exercised to avoid dangerous crevasses. On October 12, Dr. Wilson made another journey to Cape Crozier for zoological purposes. He was accompanied by Cross and Whitfield. The party had wretched weather, and on one occasion were practically confined to their tent for a week. Determined to continue his work, Dr. Wilson eked out his small supply of provisions by killing seals and penguins, and cooking with a blubber fire. They reached the ship on November 5. From lack of equipment, Mr. Royds was not able to start to the south-eastward till November 10. His party consisted of Mr. Bernacchi, Cross, Clarke, Plumley, and Scott. They were unsupported, and the direction taken admitted of no depôt. In spite of more or less constant south-westerly winds, thick weather, snowfall, continual drift, and a heavy surface, the party made steady progress, and turned on November 28 at a distance of 155 geographical miles from the ship. The whole journey lay over a

monotonous plain, in which no undulation could be detected. The marching hours averaged over nine a day, and food was cut to a minimum. Knowing as I do the barrier surface, and considering the want of support, the impossibility of making depôts, and the monotony of the work, I think this journey cannot but be described as a splendid effort. It was by no means barren of result. Mr. Bernacchi obtained a most interesting and uniform series of magnetic observations with the Barrow circle; careful observations were made of the barrier surface, including several temperatures taken in the snow surface by digging and in crevasses. The latter are especially interesting, because we have often looked for evidence to show that the barrier is afloat far south of its northern edge, and I think these temperatures go far to prove it. The series shows a steady fall to a certain depth, after which there is an equally steady rise to the lowest point reached (19 fathoms). Such an effect can only be produced by the presence of water. The party reached the ship on December 10, all being in good health, though exceedingly hungry.

"The western party left the ship on October 12. The main party consisted of myself, Mr. Skelton, Mr. Feather, Evans, Lashly and Handsley; the supporting party of Mr. Ferrar, Kennar, Weller, Mr. Dailey, Williamson, and Plumley. The ascent, which led over the icy surface of a glacier, was in places extremely rough, and we soon had considerable trouble in keeping the sledges in repair. By October 18 we had arrived at a point about 5000 feet above sea-level, and 80 miles from the ship; but here, discovering that the runners of three out of four sledges were practically disabled, we had no choice but to return to the ship. With a final march of 31 miles, the ship was reached on the night of October 21. I decided to make a fresh start to the west with the main party only, and arranged for Mr. Ferrar to proceed independently with two men, Kennar and Weller. He elected to accompany my party to the summit, and to make his geological examination when returning, at his leisure. Accordingly, I again left the ship on October 26, with repaired sledges and a party of nine. We had further difficulty with the sledges, and were delayed by thick weather and heavy winds, but on November 4 reached a height of 7200 feet. Here we were forced to remain in camp for six and a half days, during the whole of which time the wind blew furiously from the summit, the air was thick with driving snow, and the temperature was continuously low. Two attempts were made to start, but frost-bites came so rapidly that we were quickly driven back to our sleeping-bags. Towards the end the very close confinement began to tell on the party, and I had decided to get away at all hazards, when the wind fortunately lulled. We managed to get away, and over the summit, whilst Mr. Ferrar started to descend. We were now at a height of 8900 feet, at which altitude we continued as we advanced to the west. The travelling

conditions were exceedingly severe; our gear was badly "iced up" after the long stay in camp; the cold was intense, especially at night. The surface, though hard, was sprinkled with rime, which greatly increases the friction; but the most obnoxious element was a constant westerly wind, which cut like a knife. In spite of every effort, our progress became slower, and there were evident signs of fatigue in some of the party, though all endeavoured to hide it. On November 21 Handsley's chest gave him some trouble, and we were reduced to relay work. On November 22 I was reluctantly forced to divide the party. I selected Evans and Lashly as fittest to proceed, and the remaining three, much to their disappointment, were directed to return. By easy marches the returning party reached the ship on December 16, Mr. Skelton taking a number of observations and photographs on the way. The advance party was now able to make much better progress, and no further signs of fatigue appeared, though we increased the marching hours. Observations made at the most westerly camp show it to have been in lat. 77° 59′ S., long. 146° 33′ E. We made this camp on the night of November 30, and started to return on the following day. The summit of Victoria Land is a vast plain, in this latitude of a height of nearly 9000 feet. I am inclined to think that it is lower towards the north and higher to the south, but that the difference in level is slight. The wind is almost continuously westward. There was evidence that during the winter it blows with great violence from the west-south-west; during the summer it gradually shifts to the south-west and south, or even more southerly, when what I believe to be the only snowfall of the year takes place. Everything points to an extremely small snowfall. There are slight undulations or saucer-shaped depressions, the exact shape and extent of which it is impossible to determine. They are detected by differences of shade on the snow-plain, or with a levelled theodolite. The greatest difference in level seemed to be about 50 or 60 feet, and as the inclination is spread over a distance of 2 or 3 miles, it is imperceptible underfoot. Journeying east or west, we each day appeared to cross two or three long, low, irregular waves, the eastern faces and hollows of which were clothed with sastrugi of enormous height, whereas the summits and western faces were quite smooth, and afforded a good travelling surface. After a somewhat adventurous return, we reached the glacier, and made a *détour* down a northward arm, which we found to end far from the sea, and to be succeeded by a chain of frozen lakes. We returned to the ship on Christmas Eve.

"Mr. Ferrar left me on November 11 to return down the glacier valley. The valley cuts deep into the mountain ranges, with sides that are always steep and often precipitous, where the bare rock is exposed. The rocks are generally not difficult to reach, and the moraines give an excellent indication of the nature of the rock to be looked for. Mr. Ferrar's discovery of plant-remains alone indicates the importance of

this journey; but in addition to this, he was able to make a fairly complete geological survey of an extensive district, and to secure evidences of the extent of former glaciations, and of the retrogression of the present one, which I feel sure will be of the greatest interest. The details of his work will appear in his own reports, and I would add that he deserves great credit for the practical manner in which he managed his small sledge party. He had only one sledge, and that had suffered greatly from the hard rough ice of the glacier, so that he was obliged to exercise great judgment in selecting his camps, and to travel extensively from each camp, in order, as far as possible, to save his sledge from breaking down. He returned to the ship on December 11. Lieut. Armitage, Dr. Wilson, and Heald were absent from November 23 to December 12, making a survey and examination of a glacier which flows into the strait to the northward of Mount Discovery; and on November 16, Dr. Wilson, Mr. Hodgson, and Croucher commenced a small trip of eight days, spent in examining the junction between the barrier and Erebus island.

"Dr. Koettlitz spent the greater part of the summer in bacteriological work. Mr. Hodgson took advantage of the fine weather to augment his collections. Mr. Ford remained on board as cook and steward; and Dell, who, on account of a wound in his arm, was prevented from sledging, was employed in training the dog-team. The team, which consisted of six young dogs, born in 1902, soon became highly efficient; at first, in supplying the sawing camp, and later, in communicating with the relief ships, they proved of the greatest use. Before leaving the ship, I had seen a large tent made in preparation for the summer work. I directed that this tent, together with the necessary stores and a boat, should be taken to the northward before December 15, that the tent should be erected in a safe spot to leeward of some islets, about 9 miles from the ship, and that sawing should be commenced near this camp as soon as the officers and men returned from sledging. I have already mentioned that in December, 1902, the open water was close to the islets. My intention to be back by December 15, 1903, was frustrated, and Lieut. Armitage took charge of the operations, but under considerable difficulties, for the open water was not now within 17 miles of the ship or 8 of the camp. Under these circumstances, he decided to start sawing near the camp, thinking that the saw-cuts might remain open, though the floes could not be detached till the outer ice had broken away.

"The sawing was commenced on December 18, and shortly after officers and men were divided into three watches of nine, which, by relieving one another, kept one saw continuously at work. The ice was from 7 feet to 8 feet thick, and the greatest length of cut accomplished in a four hours' watch was 40 feet, whereas to clear a channel it is necessary to saw approximately four times its length.

It was soon discovered, moreover, that the saw-cuts, being filled with slush, were rapidly refreezing. The prospect was not inspiriting, yet the work was cheerfully continued.

"I reached the camp on New Year's Eve, and, seeing the futility of the work which had now been in full swing for more than ten days, arranged to break up the camp and return to the ship. With the exception of Dr. Koettlitz, Mr. Ford, and my own sledge party, all hands were employed on the saw. The work was hard, and its hopeless nature must have been obvious to every one, yet it was carried on vigorously, in the evident determination that no effort should be spared in the cause of freeing the ship.

"It was most gratifying to see the splendid state of the health of the party. Sledging and sawing had combined to bring all into the fittest condition—appetites were enormous, spirits never flagged, and it would have been difficult to find a more contented community.

"The men returned to the ship on January 2. On the following day Dr. Wilson and I proceeded to the ice-edge, and camped on the westernmost headland of Erebus island, which I have called Cape Royds. We found here a new rookery of Adelie penguins, and a number of erratic granite boulders, and decided to remain some days. At this time the ice showed no sign of breaking up; a loose patch lay off its edge, coming and going with wind and tide, but effectually damping the swell.

"On January 5, we were looking to seaward from our tent, when the *Morning* hove in sight, shortly followed by another ship, for which we were wholly unable to account. After signalling through to the *Discovery*, and arranging for the transmission of mails, we went aboard the *Morning*, and soon learnt all the news. I need not say how concerned I was to learn the extensive preparations that had been made for our relief; the letters made it quite clear how this had come about, but it was impossible not to feel the keenest regret that our position should not have been better known and such a large outlay avoided.

"The instructions to abandon the *Discovery* cast a gloom over the whole ship; the spirit in which they had been issued was understood, but on the spot, face to face with the situation, the ultimate release of the ship appeared a certainty to every one. There was not one who would not have been prepared to back his opinion by remaining by her, or who did not shrink from the thought of leaving her. Up to this time, we had all held optimistic views of our chances of release in the present season. Captain Colbeck's report of a clear sea to the north was also cheering, but towards the last week in January, when there was little change in the ice-conditions, all began to grow despondent; it seemed as though the ice were determined to exact its tribute.

"The *Terra Nova* attempted to butt the ice with a full head of steam, but the result was insignificant; some explosions were tried, but more with the idea of ascertaining the best method of using them than from

hope of an effective result. The distance was altogether too great for such attempts.

"To be prepared for all contingencies, I thought it wise to commence the transport of our most valuable effects to the relief ships on January 15. It was arranged that one large tent should be placed and kept halfway between them and the *Discovery*. The loads were taken to this tent by our own people, and from thence carried on by the sledge teams to the relief ships. The surface became so extremely heavy that the parties were obliged to spend each alternate night in the tent, and it was, therefore, only on alternate days that loads were despatched from the ship. By the end of the month, all collections, registers, instruments, and valuable books had been transported.

"The first general break-up of the ice commenced towards the end of January. A heavy swell entered the strait, and was felt very distinctly on board the *Discovery*. The ice went out very rapidly, and in large floes, which streamed away to the north-west. The result of our ten days' labour on the saws went out in one large floe. By the end of the month both ships were inside the glacier, 8 miles to the north. On February 3, the open water was within 6 or 7 miles of the *Discovery*, but by this time the swell had almost vanished, and the ice was quiescent. If the explosives were to be used, I now thought the distance warranted their trial, and went myself to the relief ships for that purpose. The ice-edge now extended in a straight line, approximately east and west, for a distance of 6 or 7 miles, and this broad front was more or less equidistant from the *Discovery* at every point. The slight swell that remained formed long cracks from 100 yards to 200 yards apart, parallel to the ice-edge, and extending its whole length. In course of time a lateral crack would suddenly spread from the edge to the outer crack, then in a very short time all the ice beyond the outer crack would strip away along the whole edge. These lateral cracks formed the lines of weakness, and it was in making them artificially that I hoped for good results from the explosives. A few trials proved so effective, that on February 6 an explosive party was sent from the *Discovery*, and all available hands from the *Morning* and *Terra Nova* were employed in digging holes for the explosion. The holes were made from the eastern extremity of the ice on a line towards the *Discovery*, and at intervals varied according to circumstances. The thickness, and in places the sodden condition of the ice, made this work most laborious, and I cannot speak too highly of the manner in which the crews of both relief ships stuck to their work. On more than one occasion, when the results warranted, they volunteered to continue throughout the night. Although at times the effects of the explosions were most inspiriting and great advance was made, there were several days when little or no good results appeared to be achieved, and as the season advanced each day became of greater importance. On

February 10 our prospects did not look bright; but on February 11 another big break-up of the ice occurred, and on February 12 the relief ships were within 3 miles of the *Discovery*. Explosions were resumed, and on the morning of February 14, this distance had been reduced to 1½ mile. At 5 p.m. on the same day another break-up commenced, and the men working on the ice could barely be picked up fast enough. The news quickly spread on board the *Discovery*, and all hands were soon assembled on Hut Point. The floes appeared to break away about as fast as the relief ships could steam through them. As usual, the broken ice streamed away to the north-west. A large pool of broken water had been gradually forming throughout the season off Hut Point, and at 11 p.m. the last strip of fast ice between this pool and the sea broke away, and amid much enthusiasm, the relief ships steamed round the point and secured abreast of the *Discovery*. Although the ice continued to break away to the south, it held fast in the small bay in which the *Discovery* lay, and here it was from 12 feet to 17 feet thick. On February 15 we were busily engaged in filling the boilers. In the night I exploded a charge which cracked the floe in all directions.

"Early on February 16, a final explosion practically cleared our small bay of ice, and the *Discovery* swung slowly round to her anchors, one of which was immediately weighed. In the evening the *Terra Nova* came alongside to give us coal, but later it blew hard from the south-west, and she again put to sea. A strong wind from this quarter was a most rare occurrence, and I expected that, as usual, the wind would quickly shift to the east; but, though it lulled in the night, in the morning it increased to a full gale without change of direction and with a rising sea. The *Discovery* has heavy anchor gear, but I knew the holding-ground to be bad, and that we were too close to the ice-foot to allow of cable being veered. Steam was raised with all despatch, but before the engines were ready the ship began to drag, until her stern was bumping against the ice-foot, and the moment that the engines were reported ready, I had no option but to weigh anchor. It was an unfortunate moment for a first trial of the engines, but all would have been well had we been able to hold our own till clear of the small shoal off Hut Point, barely a quarter of a mile from the ship. At first we did so, but later the strong current running to the northward round this point caught our bows and swept us on to the shoal, and she took the ground at 11 a.m., with wind, sea, and current all tending to place her farther ashore. In the afternoon it blew very hard, the ship bumped very heavily, and the seas broke over her. Knowing the shoals to be small, and finding a deeper sounding at the bow-sprit end, I tried with steam and sail to force her over the bank, but this only seemed to make matters worse. There was nothing to be done till the weather moderated. It was a very trying time, but every one behaved admirably, and arrangements for lightening the ship were discussed. At 6 p.m.

the wind commenced to lull, and shortly after 7 the ship was reported to be forging astern; in a few minutes there was no doubt of the fact. The engines were put full steam astern, and the ship rolled, until at 7.30 she slid off into deep water; whilst ashore, a good deal of the false keel was ripped off. Beyond this, I do not think the ship sustained any damage whatever. There was no increase in the leaks.

"On February 18, at the northern glacier tongue, we were joined by the *Terra Nova* and *Morning*, and we spent the latter part of that day and the night in dodging from side to side of the glacier, and getting in the small quantity of coal which the relief ships could spare. We received fifty tons of coal from the *Terra Nova*, and twenty-five from the *Morning*. To supply us with the latter amount, Captain Colbeck reduced his own stock to a minimum; but the total quantity was most disappointing, as, together with what remained of our own supply, we had now only 115 tons, and I knew this would be insufficient to carry out our programme of proceeding round Cape North should we meet with pack-ice. I was able to communicate my plans and wishes to the captains of the relief ships at that time. I wished, also, to water ship, and to pick up a boat which we had left on the glacier, but another gale sprang from the south-west on the afternoon of February 19, and we were forced to put to sea. We steered for the northward, the relief ships in company, and ran close along the coast-line, which was almost free of pack, as far as Cape Washington. Off this cape, on February 21, the *Morning* parted company and proceeded to the northward. As she is much better under sail and much worse under steam than the other ships, it was not desirable that she should remain with them. On February 22 we entered Wood bay, which was heavily packed, and watered ship; in the evening the ship was swung, and we proceeded to sea. The coast from Cape Sibbald to Coulman island was also heavily packed; keeping outside the pack, we met a heavy easterly swell, and during the night had much trouble with our pumps, having to put the fires out in the main boilers until the stoke-holes were cleared of water. In the morning we proceeded under steam, and passed close to Coulman island about noon.

"On February 24 we passed through the Possession islands, and shortly afterwards a bad strain in the rudder-head was noticed for the first time. We sought shelter and anchored that night in Robertson bay. The spare rudder was shipped and the ship ready for sea by 9.30 a.m. on the following day (February 25). To the northward of Robertson bay we found a vast number of birds and many streams of pack. The weather was moderately clear, and we had a good view of the coast-line, but during the evening and night were forced to keep well to the north. On the morning of the 26th it was very thick, and the pack-ice was all about us; before noon it cleared, and we proceeded along an open lead towards the land. Shortly after noon we arrived

at the end of this lead; we were nearly abreast of Smith's inlet, and the coast-line could be very distinctly seen as far as Cape North, but the pack-ice extended on all sides of us. From the crow's-nest, however, the pack did not appear close, and I could see several promising leads along the coast-line. With another hundred tons of coal, I should not have hesitated to enter the pack; but we had now only eighty tons left, and I felt, under the circumstances, that it was an unjustifiable risk, more especially as the barometer was falling, and there were all the signs of an approaching gale. We spent the afternoon in sounding and dredging, and at 5 p.m. ran to the eastward to escape from the pack. With a strong ice-blink on our port hand, we turned north on February 27, keeping approximately on the meridian of 172° E. On the 28th we got a strong south-east gale, with frequent snowstorms. The engines were stopped at 3.30 a.m., and we proceeded under sail; two hours later we lost sight of the *Terra Nova*. Hoping she would pick us up, I stood steadily on under sail on the same course throughout the day and the following night, and we saw nothing more of her until she arrived at this place. At 4 a.m. on February 29 we wore ship and stood to the westward in about lat. 67½° S., continuing on the same course throughout March 1. During the whole of this time, and since February 26, we had constantly a strong ice-blink, and every evidence of pack on the port hand.

"Early on March 2 land was reported on the port bow; we made out a long island, which we took to be Russell island, but the upper parts were entirely hidden by cloud. We passed within 2 miles of the northern end of this island, the weather rapidly clearing, and the clouds lifting, until in the afternoon we could see the whole island and other islands to the north. We were much puzzled in placing the islands. Only one thing was clear: that the island to the south, if Russell island, was one island and not three. The solution of the problem flashed on me when I again looked at the sketch of the islands given with Balleny's log in the 'Antarctic Manual.' Accepting the southern island as Balleny's Sturge island, which it exactly resembles when viewed from the north, we saw that the number and outlines of the other islands agreed with the sketch, except that Peak Freeman was hidden in cloud, and we did not see Row island, which is described as low. Since that, Mr. Mulock has plotted the angles taken during the day, and we can now say with certainty that the Russell islands are in error, and that the island so-called is Balleny's Sturge island. Considering the meagre nature of Balleny's log, that this was the only information that Ross possessed of Balleny's discoveries, and that the latter only saw land at a great distance, I think the mistake may be easily understood.

"Our movements on March 3, 4, and 5 are best gathered from the table of positions.

Date.	Latitude.	Longitude.
March 3	67° 34′ S. ...	159° 54′ E., D.R.
„ 4	67° 24′ S. ...	165° 38′ E., Obs.
„ 5	66° 23′ S. ...	154° 7′ E., Obs.

"Throughout the day and night of March 4 we stood to the north-west, taking a north-east course on the morning of March 5, so that our track lay much closer to the assigned position of Cape Hudson than the positions would indicate. After passing Balleny islands, we saw no signs of pack-ice, but bergs were fairly numerous. We had continuously a long swell from the north-west-west, but little wind. It was thick on March 3, but quite clear on March 4 and 5, when we could have seen land at a great distance. Soundings taken on the three days gave an almost uniform and remarkable depth of 250 fathoms. On March 4, a fairly good haul was made with the trawl. On this day I was much tempted to continue in a south-westerly direction, but had again to deplore the insufficiency of our coal-supply. We had now little more than fifty tons left, and this, I knew, would be barely enough to carry us to the rendezvous. The *Discovery* is a wretched sailer, and in her present trim, with the small spare rudder, is almost unmanageable under sail alone, however the yards may be trimmed. When close hauled she carries almost full weather helm, and makes from three to four points of leeway. To economize coal, we had to remain under sail alone on more than one occasion when amongst bergs, and the situation was rendered more unpleasant by the fact that there were only four hands in the deck watch. Under steam and sail she behaves exceptionally well for a ship of her class; she is very stiff and weatherly, and we have never yet found it necessary to heave to.

"On March 5 we re-crossed the Antarctic Circle, after an interval of two years and two months. From this time we had almost continuous north-westerly and westerly gales until we arrived at Auckland island. The three days were spent under sail alone, but we made so much leeway that we were obliged to get up steam again. We sighted these islands on March 14, having been close hauled throughout. Early on March 15 we anchored in Laurie Cove, with ten tons of coal remaining in the bunker. The *Terra Nova* arrived on March 19, and the *Morning* on March 23. Both ships had experienced very severe weather; they had been driven far to the eastward, and had been repeatedly hove-to. We have here refilled our boilers, and received thirty-three tons of coal from the *Terra Nova*. The *Morning* is taking in ballast, after which we shall leave for Lyttelton in company.

"I would only at present notice in general terms the conduct of the officers and men of this ship throughout the expedition. I have given my reason for touching lightly on the scientific work accomplished, believing that each officer will receive full credit for his departmental labours, especially under the arrangements which have been made with

regard to the scientific publications. But in polar expeditions there must always be times when all must work for the common good regardless of department; at such times there has been no need to ask for volunteers in the *Discovery*. On the sledges or on the saws, in coaling or watering the ship, or at any task that needed to be done hurriedly, officers and men have worked alike, and grudged no labour till the work was finished. The conduct of the men has been beyond praise. By them the monotony of the second winter was met with unfailing cheerfulness. Most arduous sledge journeys and the most severe weather were encountered in the same spirit, and with an intelligence that freed the officers from all anxiety as to their welfare. But the qualities of the ship's company has never been more evident than since our release from the ice. The difficulties I have mentioned, and many others which might naturally be expected after such a long captivity in the ice, were overcome only by incessant labour. It was, in the sailor's expression, 'Watch, and stop on,' and though many were almost worn out with fatigue, there was neither complaint nor demur when a fresh task was imposed. I shall hope to make their services better known to you on the return of the expedition. Although, as was shown, our small company were so thoroughly able to take care of themselves, and naturally felt some embarrassment at the extent of the relief expedition, I would not have it appear that we undervalue the services of the relief ships. Everything that could possibly be done for us they were only too willing to do. Captain Colbeck's arrangements with regard to stores, etc., appear to have been excellent, and this year, as last, he has shown himself ever ready to sacrifice his own interests to ours. His conduct of the relief expedition deserves the thanks of his former as well as his present employers. His services were ably seconded by those of Captain M'Kay of the *Terra Nova*. Of the officers and crews of both ships, I can only add that I believe they were almost as anxious as ourselves to see the *Discovery* released, and almost as pleased when that event was happily accomplished."

THE SWEDISH ANTARCTIC EXPEDITION.*

By Dr. OTTO NORDENSKIÖLD.

It is with a full consciousness of the great honour accorded me, that I have accepted the invitation of the Royal Geographical Society to submit to you this evening the first account given outside Scandinavia of the Swedish Antarctic Expedition, of which I was head.

* Read at the Royal Geographical Society, March 21, 1904. Map, p. 128. The map is only a provisional sketch-map, as it has not yet been possible to draw up a map embodying the exact measurements of the expedition.

It was as a representative of your great Society that Sir James Ross, upwards of sixty-five years ago, embarked upon an expedition to the south polar regions that, as regards its results, has not to this day been surpassed. When, further, at a recent date, the determination was arrived at to renew in earnest the exploration of the least-known regions of the globe by means of an international effort, in which my expedition formed a part, the first vessel to leave European waters on that quest was the one towards the equipment and despatch of which the Royal Geographical Society contributed so materially. The splendid achievements of that expedition in the first year of its work no one can better appreciate and admire than I and my companions, who have had an opportunity of acquiring first-hand knowledge of the difficulties and dangers that Antarctic conditions of climate and ice present.

It would, consequently, be a work of supererogation to say anything in this audience as regards the importance and objects of modern south polar exploration work. I will merely recall the fact that, whilst England and Germany were the first nations to come forward with proposals for carrying into effect the resolution adopted at the International Geographical Congress held in London in 1895, by organizing exploration expeditions destined respectively to the Antarctic regions lying south of the Pacific and Indian oceans, it appeared for a time as though nothing was to be done towards equipping any vessel for similar work in the Antarctic region situated south of the Atlantic ocean, the region nearest to Europe, and possessing, besides, features of great importance, as being the only part of the Antarctic area containing large tracts of land free from snow, and as bearing a striking and particularly interesting analogy to the continent of South America, from which it is not far removed. That was the state of affairs that led me in 1899 to draw up the first plan for the expedition whose fortunes and results I now propose roughly to detail.

The numerous and manifold difficulties to procure in Sweden from private donors the wherewithal for the equipment of so extensive an enterprise, entailed a postponement of our departure from Gothenburg until October 16, 1901. When once fairly started, however, we lost no time *en route*, and by New Year's Day, 1902, we were able to leave Port Stanley in the Falkland islands, and so bid good-bye to civilization. It would not be too much to say that we had then drawn up level with our sister expeditions, which had sailed from Europe in advance of us. A brief call at the Argentine Observatory on Staaten island unfortunately proved of no avail, inasmuch as their instruments had not yet been set up, consequently it was not possible for us to compare our magnetic instruments until our return home.

On January 10, after a good passage, with no ice in sight, we reached King George island of the South Shetland group. In spite of all descriptions of those islands, the most accessible of the south

polar lands, I must confess that I was surprised upon seeing them. I had expected to find a strip of shore free from snow, and showing a collection of the scanty vegetation found there. But, on the contrary, I beheld one glittering sheet of ice, bluish-white in colour, with only a few ruggedly steep peaks standing out dark against the white mass, which ends against the sea with a precipitous wall of ice.

There is surely nowhere in the world such a startling transition from one nearly adjacent shore to another as exists between the evergreen virgin forests of Cape Horn and this ice-desert, a counterpart to which is scarcely to be found in the northern hemisphere, and which commences at a latitude equivalent to that of the central parts of Sweden. A very short study of the region was sufficient to convince us that all previous estimates regarding the character of the climate prevailing there must infallibly be in error, and that a greater severity than has hitherto been assumed must be prevalent. The experience gained by our expedition has fully justified this first impression.

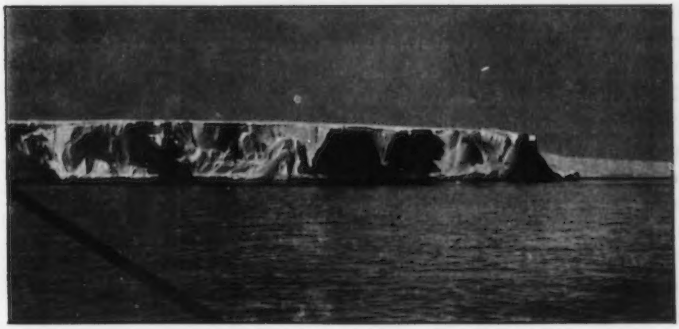
On the morrow we landed for the first time in our new world. By that time we had discovered, in Harmony cove on Nelson island, a small sheltered bay; the land behind was fairly free from snow, and the shores were populated by a large number of seals, penguins, and other representatives of an animal-life quite new and unknown to us. It may easily be imagined with what eagerness we hastened to make acquaintance with all these novelties. The botanist of the expedition secured a fine harvest, though the vegetation was not so luxuriant here as in some more sheltered spots on the Orleans channel. The bedrock proved to be a porphyrite, the age of which it is difficult to determine.

The first task that now lay before us was to investigate the so-called Orleans channel, discovered by D'Urville. There were good reasons for assuming that we should find that the channel formed a direct communication with the east coast. That, however, was not the case; we discovered that it turned off to the south-west and ran into the Gerlache channel, with no perceptible boundary between the two, the one consequently forming, in reality, a continuation of the other. At the same time we discovered the stretch of land uniting Louis Philippe Land and Danco Land, and I was already able in my report at the time to state my conviction, which our work of the succeeding summer afresh confirmed, that the former piece of land constitutes a continuation of Biscoe's Graham Land; thereby the existence of the so-called Dirk Gherritsz archipelago may be considered to have been disproved once and for all.

It would have been of great interest to have been able to continue our labours there, but we were constrained to hasten on to the east coast, where our main researches were to take place. Before passing on to the description of them, I will tarry a moment to point out the characteristic differences in the rock formation in these zones. To the

west there stretches a lofty range of mountains, with bold jagged peaks surrounded by glaciers, which run into one another along the shore forming a narrow ice-foot. Further east, and also on the islands, the land is lower in elevation, and, as a rule, much more consistently covered with ice, so that, save for a few isolated points that rise like nunataks, and some perpendicular rocks, only occurring along the actual edge of the shore, the solid fundament is not visible at all. Of the very different nature in the environs of Seymour island, I shall later have an opportunity to speak.

On January 15 we entered Erebus and Terror gulf through the channel separating Louis Philippe Land and Joinville island. To this channel, undoubtedly the best access to the region, I have later given



AN ANTARCTIC ICEBERG.

the name of Antarctic sound. Our intention now was to go along the coast as far south as possible. On our way we established a depôt at Cape Seymour, leaving at the same time a record of the progress of our journey. Even at this stage we could perceive that the condition of things as regards the ice was anything but promising, and only two days later I was roused early in the morning to climb into the crow's-nest and observe the ice-conditions. It was at once clear that our chances of being able to advance further were non-existent. To the south and south-east there was to be seen an almost solid mass of pack-ice, while to the west was rising a lofty ice-barrier, obstructing all view of the interior. At that juncture we were a trifle south of the 66th degree of latitude.

We now turned back northwards, and in vain endeavoured on our way to reach the Seal islands, which were completely ice-locked. There now remained two courses open to us—either to stay for the rest of the summer in the northern archipelago for the pursuit of scientific research, or to carry out our original programme by trying to find a way

southwards through the ice further east, as Weddell once succeeded in doing. Unfortunately the summer was already far advanced, and as it was essential to avoid having to spend the winter frozen up in the ice, and we required, moreover, a fair margin of time for preparing and arranging our winter quarters, there was no great prospect of our being able to progress any great distance southwards on that tack. I was, nevertheless, loth to relinquish the matter entirely, and during the remaining days of January we continued our course eastwards. By the end of the month—thanks to fog and contrary winds—we had not got further than the 45th degree of longitude, and the only important result of our efforts was the discovery we made that the sea there has a very considerable depth, viz. of nearly 2000 fathoms.

It now behoved us to retrace our steps to Seymour island, in order that we might secure a fitting place for our winter sojourn. This procedure was entirely in accordance with my original plan, but, besides that, the idea I had formed of the region from the little I had already seen, convinced me that a more interesting district in which to winter, whether from a geographical or geological point of view, could not be imagined. On our way we paid a brief visit to Sidney Herbert bay, which I, even then, found reason to suppose was a channel rather than a bay. On February 12, early in the morning, we entered Admiralty inlet, where we soon found a small and, as we thought, sheltered bay, situated just where the snowless tract of country ends, and the extensive level ice-area of Snow Hill commences. There we determined to establish ourselves for the winter.

The members of the expedition who were to be my companions here were Dr. Bodman, meteorologist and magnetician; Dr. Ekelöf, physician and bacteriologist; Lieut. Sobral, assistant meteorologist; and two sailors, Jonasen and Åkerlundh.

A wind that began blowing from the north-east commenced to drive the ice down upon us ominously, so that only two days after our arrival, on February 14, the *Antarctic* had to set sail rather suddenly, leaving us behind on shore—not insensible, to be sure, to the feelings that the parting with our comrades under such circumstances inevitably gave rise to, but so full of work for the immediate future, that we had little time to indulge in wonderings as to the respective fates before us, and when, if ever, we were destined to rejoin our forces. There was an abundance of tasks awaiting our united efforts: the erection of a house and observatories, the arranging of all our properties, and the mapping out of the various scientific pursuits we were intending to take up. All hands were, consequently, fully occupied, but the success of our endeavours was very materially impeded by the state of the weather. From the very first we were exposed to severe storms and great cold, and that in spite of the season being what for that part of the world is the height of summer. Thus, ere it could be completed, our magnetic

observatory was blown down, and one night all our Greenland puppies, which we were relying upon for very essential assistance, were frozen to death.

The same storm that played such havoc with our preparations and property on shore, dealt very harshly, too, with the good ship *Antarctic*, at that time in Bransfield sound. She was very much knocked about and damaged, lost the best of her boats, and only just succeeded in keeping off the rocks lining the coast. Our experience of both years seems to prove that there is no counting upon any summer from and after so early a date as the middle of February.

By the middle of March we had made sufficient progress with our

EDGE OF THE ICE-PACK, WITH SEALS, IN THE WEDDELL SEA.

labours to enable me to set out on a boat-expedition down Admiralty inlet, partly for the purpose of reconnoitring our surroundings, and partly to establish a depôt, to be of service on coming sledge expeditions. On the second night we were out a violent hurricane overtook us, and what with the cold—the thermometer registered zero Fahrenheit—and the heavy sea that smashed up the ice-floe upon which we had sought refuge, we came very near destruction. As it was, we had to remain for twenty-four hours exposed to the elements, for to put up our tent was quite out of the question. On the following day, however, we managed to put out again into open water, and return to our starting-point before the severe frost had time to effectually bar our passage.

By that expedition I was able to establish that Admiralty inlet is in reality a channel, branching indeed to the south into two arms, which enclose the island on which Cape Lockyer is situated. This may be a suitable point to insert a brief geographical description of the surroundings of our winter station, such as we gradually discovered them to be in the course of our stay. The station was situated on an island, Snow Hill island, consisting for the most part of one unbroken dome of ice, named by Ross, Snow Hill. I made a thorough study of this land-ice, taking systematic observations with reference to its movement, registering the temperatures of different depths, variations in its structure at different seasons, etc. On all sides the ice displays a fine stratification, traceable to the original snow deposit. The ice forms one continuous mass, save for three small "noonataks;" * on the sea side it terminates in a perpendicular wall, varying in height from 10 to 100 feet; at the point where we had fixed our station, however, there is a sudden and abrupt break, the northern portion of Snow Hill island and the whole of Seymour island being free from snow, thus forming what is probably the largest snowless area existing in the whole of the Antarctic continent. These islands are formed of richly fossiliferous sandstones, permeated with basaltic dykes.

The two islands situated in Admiralty sound, Cockburn island and Lockyer island, and also the land facing them, to which I later gave the name of James Ross island, are mainly formed of beds of basalt tufa, which rest upon the same fossiliferous sandstone as exists in Snow Hill island.

On our return from the sledging expedition mentioned above, the winter closed in upon us, and for upwards of half a year we were practically confined within the four walls of our domicile. The house, constructed in Stockholm, had double walls of boarding, separated by an air space, and lined both inside and out with tar-board. We found the accommodation afforded us by this building quite adequate to its purpose upon the whole. In the middle was one large room occupying the whole breadth of the building, flanked on either side by two smaller ones; three of the latter served us as bedrooms, with sleeping accommodation for two in each, while the fourth was the kitchen. Over the whole extended a large garret. The space was limited even for our small party, but we considered ourselves well off, and could devote ourselves to whatever employments we had on hand. Nor did we lack for occupation. There was mapping work to be done, astronomical, magnetic, geological, bacteriological, and physiological researches to be

* This is quite contrary to the statement of Sir James Ross ('Voyage to the Southern Seas,' ii. 344) that there are "no projecting rocks through it." It would be very important to know if this is due to a diminution of the thickness of the ice since that time.

carried out, and observations on the tides to be taken; so that our time and attention were fully engrossed. First and foremost we were concerned with the meteorological observations, which as a general rule were registered every hour all through both day and night. And here it is fitting to pause a moment to consider the results that these observations led to, for they go to prove that the climate that prevails in that region must be regarded, by reason of its unexpected severity, as possessing an exceptional interest. It was for a long time assumed that the winter in the south polar regions was, comparatively speaking, a mild one, and even the experiences of Gerlache and Borchgrevink had not given rise to any supposition that at a latitude of only 64½°

THE WINTER STATION AT SNOW HILL.

a winter temperature averaging for the months of June to August (1902), −21·7 C. (−7° Fahr.) would be registered. The average temperature for the whole year worked out at −12° C. (+10° Fahr.), approximately equivalent to those of the Lena valley and of the Hudson strait territory, the two coldest regions at the same latitude in the northern hemisphere. The temperature proved, moreover, to be lower than that noted by Gerlache and Drygalski for more southerly latitudes than ours, and only 3° higher than Borchgrevink found 7 parallels nearer the pole, and 9° warmer than Scott on board the *Discovery* registered at almost 14 parallels further south. These facts would seem to render it very probable that the southern pole of maximum cold has a considerable

bias towards the Atlantic side of Antarctica. This observation, in itself, may be fairly deemed to demonstrate the significance of an expedition having been organized to that region contemporaneously with the two others to different parts of the Antarctic seas.

To judge, however, of the characteristics of a climate, it is not sufficient to consider the conditions of temperature alone; the conditions of wind, especially its force, must likewise be taken into account. A temperature of from $-30°$ to $-40°$, which in still weather is by no means unpleasant, becomes well-nigh unendurable if a gale is raging. In regard to the frequency of high winds, I have no hesitation in asserting that our first winter was quite unique. At all events, the statements made with reference to Gerlache's, Borchgrevink's, and Drygalski's expeditions, denote that the average force and prevalence of gales with them were far less than was the case with us.

No words can suffice to adequately describe the terrible violence of these south-west hurricanes, which are accompanied by the severest cold ever experienced where we were. Everything outside is calm and fine; the barometer, however, is to be seen falling rapidly, though, after a time, it suddenly stops. On looking around the horizon, one then becomes conscious of a slight mistiness in the south-west; then come a few violent gusts of wind, and, within the space of a few moments, without any further interval of transition, the hurricane is upon one in all its fury. The atmosphere has become so thick with the fine snow-dust which is being hurled along in immense clouds, that it is impossible now to see more than a few paces in front of one. The snow comes driving through every chink and cranny, and settles everywhere and anywhere. To be outside the house is an impossibility, for one cannot proceed against the wind, which takes away one's breath, and the sharp crystals of frozen snow sting one's face beyond endurance. Bits of board, wooden boxes, and other trifles, become the sport of the gale that whirls them about on the floor, while even heavy articles are shifted from their appointed places. On the velocity of the wind increasing yet more, to as much as 70 or 90 miles an hour, the destruction and disturbance it causes become yet more formidable. Stones pelt upon the walls of the house, and the whole building is shaken; when all had become calm again, we were often obliged to use up the brief intervals of fine weather in searching for articles that had been blown away. Barrels of bread, big boxes with all their contents, one might then find far away on the ice. On one occasion the roof of the observatory had been transported about 1000 feet through the air, to be then smashed against the rocks. After one of the very severest of the storms, we made the disagreeable discovery that our largest boat had been carried along the shore for 100 feet and demolished against the ice-crags, while the oars and other material lay strewn about on the space between.

Descriptions of violent storms are familiar enough to the reader of reports of south polar research expeditions; the novelty, as far as we were concerned, consisted in the frequent occurrence and protracted duration of the storms that visited us. The average velocity of the wind for the eight winter months (March to October) in 1902 was 31 feet per second, which is probably a record for so cold a climate.

We were worst off in July and the first half of August, the temperature then falling as low as −42° Fahr.

From the middle of August things improved, and on the 18th we sighted and accounted for our first seal.

In the middle of September a strong warm wind from the north-west

A VALLEY NEAR SNOW HILL STATION. MOUNT HADDINGTON VISIBLE IN THE DISTANCE.

commenced to blow, and lasted a few days; it drove the ice away from the land, and we began to imagine that spring was already at hand. The gales and the cold returned, however, and at the end of September everything was as wintry as ever.

In spite of its severity, the winter passed rapidly away, and we were happy enough in our surroundings; but it is easy to see that the conditions of the weather forbade my embarking on any extensive excursions from our winter quarters. In April, July, and August I made a few sledging expeditions, for the purpose of investigating Seymour island and Admiralty Sound inlet, but venturing further afield seemed too foolhardy and risky to be thought of.

With the approach of spring, however, I became anxious to be off,

at as early a date as possible, to explore the unknown coast running southwards, and on September 30 we were at last able to start.

My companions were Lieut. Sobral and Jonasen. According to the plan I had worked out, I had hoped to be able to extend my absence from headquarters to a period of fifty or sixty days. Unfortunately, we had been unlucky with the dogs we had brought with us, and now the number available for our trip was four Greenland dogs, and one of these we had brought from the Falkland islands. It seemed an utter impossibility to do in any way with less than two sledges, and so I arranged that the dogs should all be harnessed to the heavier-laden of the two sledges, and that Lieut. Sobral and myself should lead the way, dragging the other sledge ourselves. Furthermore, it was clear that it would be out of the question for us to have with us sufficient equipment for so long a period as fifty days, if our rate of advance was not to be retarded altogether too much, so that I determined only to take dog-pemmican for three weeks, confidently hoping that we should encounter on our route along the coast both seals and penguins, which might serve as food for the dogs.

For the first week we were favoured with excellent weather and capital ice. Our rate of progress was, nevertheless, not equal to my expectations; I had good reason to observe how very much more advantageous it is to employ dogs as beasts of draught, in place of discharging that labour one's self, more especially when it is desirable to advance quickly.

The course we followed during that first week led us parallel to, but at some distance from, the coast of an elevated mountainous country. The configuration of it was a series of rugged jagged crests, behind which there extended a large ice plateau, from which immense glaciers descend, leaving only the highest peaks snowless.

This coast territory forms a continuation of the land discovered by Larsen, and named by him King Oscar II. Land, and I consider that that designation should be applied to the whole coast territory as far as to 64° S. lat., where the Louis Philippe peninsula may be considered to begin.

On October 7 we reached Christensen island, which we found to consist of the remains of an ancient crater. I climbed to the top of it, and obtained a capital survey of the surroundings. A phenomenon was from this point of vantage presented to the view, which, so far as my own experience goes, has no exact counterpart anywhere else, though it is probable that it somewhat corresponds to the ice-terrace which is terminated by Sir James Ross's celebrated ice-barrier. The islands known by the name of the Seal islands are in reality a species of noonataks projecting above a low level ice-terrace, which at this latitude has a breadth of from 40 to 50 miles, and which extends as far south as we have knowledge of, at any rate, for more than one degree of latitude.

Its boundary with the sea is an ice-barrier of varying altitude. It seems probable to me that this ice in part rests upon land, but also in part, and principally, covers a shallow sea, and that it has been for the most part formed *in situ*. From a scientific point of view the phenomenon above briefly described is of exceeding interest, though for our purposes at the time it presented a material inconvenience, inasmuch as we had now to cross it, and knew that we did not stand the least chance of being able to replenish our scanty supplies of food for the dogs meanwhile.

We pushed on, however, at an increasing pace as our burdens diminished in natural course, though the difficulties we had to contend

THE ICE-BARRIER NEAR SNOW HILL STATION.

with now began to thicken. A fresh period of storms set in, the temperature sinking to $-20°$ to $-25°$ Fahr. We had the wind in our teeth, and were fain, even for several days at a time, to lie still in our sleeping-bags on account of the storm. At length, on October 18, we neared the land. The last piece of our way across was the worst by far. Here the ice rose considerably higher, and was traversed by broad deep cracks, which we only succeeded in crossing with great danger and difficulty. We found ourselves, however, finally at the end of our troublesome journey, and were able to pitch our camp in the shelter of a lofty headland that apparently formed the south-easternmost point of King Oscar II. Land.

The very same night a hurricane arose that caused us great

discomfort. Our tent was torn by the wind, so that we had the utmost difficulty in repairing it in the dreadful weather and in getting it set up again in a sheltered spot high up among the rocks. To crown our misfortunes, Jonasen fell down and injured his arm while engaged in carrying a big stone to help steady the tent. The provisions we had brought for the dogs were now at an end, and we were obliged to share our own pemmican with them. In this state of affairs, with a dearth of provisions and the broken and stormy weather, it could not be considered other than perilous to pursue our expedition, and I resolved that it was incumbent upon us to make our way back again.

The severe weather still kept on, but as we now had the wind behind us, we were not so often under the necessity of remaining stationary on account of it. We covered a great deal of ground every day, and had already reached our winter station once more on November 4.

Our journey out and home again amounted to about 400 miles in distance. The chief results we obtained were the discovery and the mapping of the inner coast-line as far south as 66° S. lat., and also the discovery and investigation of the great ice-terrace. We had, however, also carried out geological and meteorological work of considerable interest.

November was principally devoted to the pursuit of scientific research work in the vicinity of the station. At the beginning of December I undertook a sledging expedition to the northern portion of Seymour island, to study its geology. The strata there are characterized by the absence of ammonites, which occur in such large numbers in all the older strata which belong to the Middle or Upper Cretaceous; I assume that they are of the earlier Tertiary age.

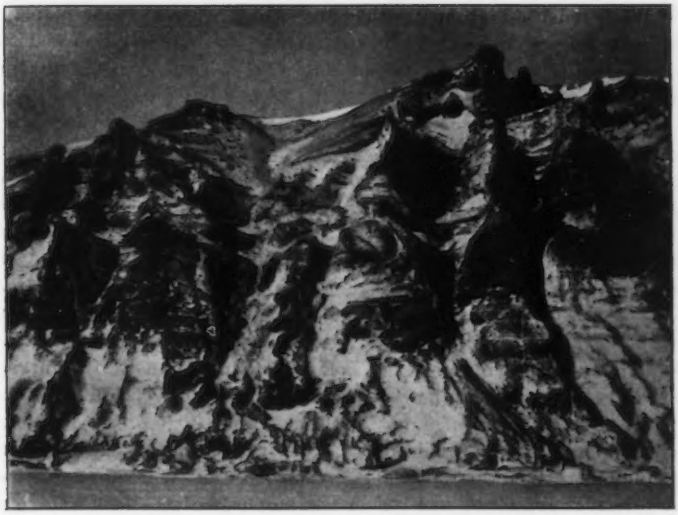
In these strata I made two discoveries on the same day, and they are among the most important of the whole expedition. The first was a number of miscellaneous bones of vertebrates lying scattered about, principally the remains of a penguin, larger than any species now living. The second was a large number of tolerably well-preserved leaf-impressions belonging to a variety of forms. This discovery proves for the first time that in the south polar regions, as has long been known to be the case with regard to those round the north pole, a warm climate with luxuriant vegetation existed at a—in geological sense—recent period. I had, moreover, been able to collect remnants from the animal world that once inhabited that ancient continent.

Now the time arrived when we began seriously to look for the return of the good ship *Antarctic* to carry us away from our voluntary isolation. What a weary time of waiting and expecting that was destined to be! The weather was cold, with fog and gentle winds. Now there came no gales to assist in breaking up and dispersing the ice. Our summer time, spent at that spot 2° north of the polar line, was the coldest ever

known up to that time. The British expedition, which was 14 parallels further south at the time, experienced a still greater degree of cold.

There were some small leads in the ice and a water-sky in the north, but no open channel that would admit of a vessel finding its way to us. Consequently we never became really anxious at the non-appearance of the *Antarctic*, and never thought but that she would eventually reach us. And well it was that none of us were able to surmise what a fateful drama was being enacted during those weeks of waiting almost within sight of our station

At the beginning of February there was a sufficient amount of open water along the shore for us to get by boat to Seymour island to kill



SANDSTONE CLIFFS (CRETACEOUS) NEAR SNOW HILL STATION.

some penguins for our needs in view of the coming winter. The task of slaughtering these strange creatures is by no means a pleasant one, by reason of the resemblance they bear in behaviour to human beings, and from the circumstance that by degrees one comes to regard them almost as companions in the solitude of those regions. We had, however, no choice in the matter. We accounted for some 400, but they had almost entirely disappeared by the time the relief came.

We also killed at the same time all the seals we could get within reach of, partly to use their blubber as fuel, and partly for the sake of providing our dogs with food. Experience showed us, moreover, that we could consume seal-flesh with considerably greater relish than the hard and dry flesh of penguins.

By the middle of February heavy gales and intense cold had already set in, and very shortly we had winter all around us once more. I will not here speak about the winter; I will only mention that we were very fully occupied, and that we realized that the value of our observations would be very materially enhanced, now that we had a chance of registering them all over again. We naturally often wondered how our sister expeditions were faring, and almost hoped that they too had been constrained to tarry by reason of the ice, for the sake of thereby obtaining a new series of observations from their localities likewise. A comparison of our results and those of the British expedition should be exceedingly interesting, and not less so one between ours and those registered by Mr. Bruce at a spot so close to where we were.

We found the first months the most trying, when the long period of darkness was before us to be looked forward to; our isolation and the uncertainty as to what awaited us were what occasioned us the greatest anxiety.

As the spring once more came round, I started off again on a sledging trip, this time to explore the unknown parts north of our station. Profiting by experience, I determined on this occasion to take only so much as the dogs could manage to draw. To that end, I contented myself with only one companion. After one unsuccessful start, when our tent was torn by the wind, we got off on October 4. After passing Admiralty sound, we turned northwards into an inlet we had discovered the year before. The landscape we then had in front of us was of a grand description: to the west, the northernmost part of King Oscar Land, displaying the same bold and sharp outlines of mountains as we had observed further south; then further on, the hitherto unknown southern edge of Louis Philippe Land; to the east rises the majestic form of Mount Haddington, with its even-surfaced ice-slopes of opaque blue. As we progressed, it became more and more apparent that my primary supposition had been a correct one, and that we were now in a channel affording a through waterway, the land situated on our right hand consisting of islands. This remarkable channel, to which I gave the name Crown Prince Gustaf channel, derives its chief interest from the analogy it bears to the deep depressions on the eastern side of the South American Cordilleras, where, moreover, the formation of the mountains on either hand resembles that which I found to prevail here.

The passage through the channel occupied us about a week to accomplish. On October 12 we had at length reached its eastern extremity. We were proceeding rapidly on our way, when, under a high and precipitous rock on the shore, we suddenly caught sight of a couple of black objects of strange appearance. They were not seals; but what were they? My first idea was penguins, of which we had not seen any that year; but they were too large, and they moved about, too, in such

a strange manner. I applied my glass to my eye, and at once made out that they were human beings.

Never before have I experienced such emotions as this discovery brought surging upon me. To come upon human beings in this desert wilderness, and for us, who for a period of twenty months had been fain to content ourselves with our own society! And who in the world could they be? Wild suppositions came before my mind in rapid succession, only to be rejected as soon as entertained, each seeming in turn more impossible and unlikely than its predecessor.

The figures had likewise noticed us, and now both parties set off towards each other. The nearer we approached them, the greater became my astonishment. The sight which presented itself to my

CAMP ON SEYMOUR ISLAND, COCKBURN IN THE DISTANCE.

astounded gaze was that of two men who were black from head to foot, having, moreover, long black hair hanging down over their shoulders, and black bushy beards. What rendered them, if anything, still more unrecognizable was the wooden eye-masks which they had probably invented themselves as a substitute for snow-goggles. The only thing about them that seemed to betray a certain degree of civilization was their skis. A feeble "Hurrah!" from them as we drew closer showed that the meeting with us was a source of delight to them.

It was not until we had greeted them, and they had told us their names, that I realized who they were—none other than two of my own fellow-voyagers in the *Antarctic*, viz. Dr. J. G. Andersson and Lieut. Duse. They, together with one other member of the party, had left the vessel during the preceding summer to attempt to effect a junction with us, and now, after a winter spent in solitude, were again on their way to our station.

It would be impossible for me to find words to describe my thoughts

at that moment, as I listened to that bare explanation of who and what those strange-looking creatures were. Surprise, amazement, and curiosity soon yielded place to keen and heartfelt sympathy within me, as I realized as in a moment what these poor fellows had had to endure. There was, indeed, every reason for feelings of surprise and amazement to come upon me. During the long months of our isolation, it was natural enough that I should picture to myself the first meeting with representatives of the human family. But in all my imaginings such a contingency had never presented itself that I should, on that occasion, play the part of the rescuer of individuals who, to all appearances, belonged to one of the lower types of men that live in the natural state, and who, indeed, in many particulars had been constrained to adopt the modes of life of such beings.

We now hastened back to the point from which our two strange friends had come upon catching sight of us, and on shore, beside their tent, we found the third member of their contingent, Grunden, one of the *Antarctic's* sailors, busy preparing their dinner. It was not quite so simple a matter as might be supposed getting there, for our dogs took fright at the forbidding-looking black figures, and were ready for bolting in any and every direction but the one we desired. They were, however, at length reduced to tame obedience, and on arriving we pitched our tent alongside the other one. We determined, further, to remain at the spot for the night, that we might celebrate the strange meeting as best we could with the means at our disposal, and find time besides to exchange news of how each party had fared since our separation.

By degrees we elicited the account of their doings. As Dr. Andersson, in the February issue of the *Geographical Journal*, has already published some information with regard to his and his companions' experiences, it will not be needful for me to do more than give an outline of the same. During the first winter the *Antarctic* had been very successful as regards scientific work, and had collected many valuable results. At the beginning of November, 1902, the vessel left Tierra del Fuego, full of the most hopeful anticipations for what lay before them. But Fate had determined otherwise. While they were still considerably north of the South Shetland islands, they encountered pack-ice, which they had great difficulty in making their way through. Bransfield strait and Orleans channel, on the other hand, were almost clear of ice, and there they spent a couple of weeks, which were very agreeable and fruitful of results. At the beginning of December they pursued their voyage, now bound direct for their destination, our winter station, that they might bring us away, and so accomplish the object of their mission. The distance that separated them from our station was so short that, had the conditions of the ice been as in the year before, they would have reached us in twenty-four hours. As soon as they entered

Antarctic sound, they found the whole of the Erebus and Terror gulfs filled with ice, with hardly a fissure in it. An attempt to go round Joinville island proved unsuccessful, and on their return, at Christmas-time, to Antarctic sound, the ice was as solid as ever.

It was at this time that Dr. Andersson formed the brave resolve to try and make his way to our station. They landed in a small bay on the western shore of the Antarctic strait on December 29; the bay was subsequently christened the Bay of Good Hope. They at once started off on their march, but soon found that the state of the ice at that time of the year was such as to preclude so long a journey, and they were forced to return to their starting-point, there to await the return of the *Antarctic*. Their wait proved, however, long and fruitless; they were never to see the vessel again. At first they worked away eagerly at investigating the neighbourhood from a scientific point of view, and it was at this time that Andersson came upon a well-preserved fossil flora from the Jurassic Period, which proves that the vegetation here at that time was the same as that of India.*

As the summer gradually passed away, and they saw no sign, they began to be uneasy, and commenced to prepare for the coming winter by collecting provisions, and by erecting a hut of stone. The hut was constructed in the following manner: round and about their largest tent they built a thick stone wall, and over the whole they placed a piece of tarpaulin. The abode was thus provided with double walls, and when the snow came and heaped itself all round, they were able to keep up an average temperature inside of but little below freezing-point. They used seal-blubber as fuel, making the fire in a large preserved-meat tin, without employing any wick; by practice they acquired considerable skill in the art of firing by those means. They partook of a small portion of bread every day, and a cup of a brown liquid, supposed to represent coffee; they indulged themselves, besides, in preserved meat or fish once or twice every week, but otherwise their sustenance was derived from the flesh of seals or penguins, boiled in sea-water instead of salt.

The part of their lot they found hardest to bear was the protracted confinement through the long stormy winter; they had often to remain lying in their sleeping-bags for several days in succession without any light, and, moreover, without anything to read, had they been able to see. The winter passed wearily away, and with the advent of spring they began to get in trim once more for a sledging trip to our station. The stores they had carefully treasured up were produced, but they had only one sail-needle between them, and they had to take it in

* According to Prof. Nathorst, these fossils agree pretty well with those from the Upper Gondwana series in India; also with those described by Kurtz from the province of Neuquen, in the Argentine Republic.

turns to have the use of it for the repairing of their various garments. They set forth on September 29, and here we had met in this marvellous fashion out upon the ice.

With rapid marches we now hurried back to Snow Hill, choosing a passage further inland, that forms a connecting link between Crown Prince Gustaf channel and Sidney Herbert bay. Our return was, naturally enough, the signal for great rejoicing among those we had left behind. On finding ourselves at home again, we at once recommenced with fresh eagerness our scientific avocations, and not a day passed without some of our party being absent on exploration bent. Dr. Andersson and myself spent most of our time on Seymour island, collecting specimens from its rich strata of fossils. We had never enjoyed such beautiful weather as now since we first arrived in those regions. The sea further out was almost clear of ice, and it was not without a degree of anxiety that we contemplated the possibility of our labours being cut short prematurely by the expected arrival of the rescue expedition. But up to that time we had not relinquished the hope that it would be the *Antarctic* herself that would come to carry us off, and in that case we should be able to look forward to a summer of busy occupation, yielding valuable results.

On November 8, when two of our party were absent egg-collecting, and the rest of us were at home at the station, some one entered my apartment and informed me that there were some people to be seen out on the ice; "but," he added, "it looks as though there were *four* of them." The excitement that ensued, when the telescope confirmed this supposition, is easier imagined than described. We all hurried out, helter-skelter, and down on to the ice, to welcome the new-comers, who we judged could not well be any others than members of the *Antarctic's* contingent, since it was as yet too early, as we calculated, for any vessel to have reached us from Europe.

What by rights should have been the most joyous moment in the whole history of our journey was turned, at a blow, into the most sorrowful and melancholy, on our learning, from the two foreign officers before us, that no news had come to hand of the *Antarctic* or her crew. This intelligence was such a shock to me, that I stood rooted to the spot, as one paralyzed. I could not but own to myself that the chances of ever seeing our comrades again were exceedingly remote.

The officers we were confronted by, who had such gloomy tidings to bring us, were Captain Irizar and one of the officers on board the Argentine frigate, the *Uruguay*. They had made the expedition for our sakes, and now invited us to accompany them home. Through them we learnt of the Swedish expedition, under command of Captain Gyldén, also despatched to our relief. The *Uruguay*, however, had brought no letters or official communications for us.

The circumstances being as above related, there was practically nothing for us to do but gratefully to accept the proffered means of returning to civilized parts of the Earth. The day passed quickly, and towards evening the Argentine contingent returned to their vessel. That they might lose no unnecessary time on the way, I instructed Jonasen to put the dogs into the sledge and drive them across. Later in the evening we were each and all of us silently and thoughtfully

EMPEROR PENGUIN.

busy at work in our house, I myself being occupied with the report I was intending to leave behind us at Snow Hill for the guidance of the Swedish Relief Expedition, containing suggestions as to the best means of endeavouring to discover the fates of our comrades on the *Antarctic*, when suddenly the dogs outside began to howl fiercely.

The noise led to one of the party going to the door to look out, and on returning he announced that there were some people down on the ice. I at once framed and announced the supposition that it was merely Jonasen coming back, and that Captain Irizar had sent some of

his crew with him to render us assistance in packing up our goods and belongings. We were all so engrossed in what we were doing, that we never even troubled to see if it was so or not. Then, however, such a long pause ensued, without anything further being heard, that eventually Bodman got up to make certain as to what was going on. All of a sudden, we were startled to hear from without wild yells and cries and hurrahs, among which the only distinct words we were able to catch were "Larsen, Larsen." We all instantly now left our several tasks with one ado and made for the open—and, lo and behold! whom should we see standing on a knoll in the wondrous half-light of an Antarctic summer night, but Captain Larsen himself and five of his men, weathered of feature and disreputable of garb, but sound and well of body and limb.

After an absence of almost two years, here they were again—turned up in the middle of the night succeeding the very day upon which we had received intelligence causing us to despair of ever seeing them again; they had at length reached us at the very juncture when relief and rescue were offered us, in which they too would now be able to share.

In course of time we obtained from them the details of what they had experienced and gone through during the period that had elapsed since they put Andersson and his companions ashore to make their way to us. They had first tried to circumnavigate Joinville island, but had very soon got stuck fast in the ice. With persistent energy they had nevertheless held to their course, and had succeeded in making some advance, so that, by dint of availing themselves of every opportunity that presented itself, they had ultimately got approximately on to a level with our station, and by help of the telescope had been able to distinguish the low hills in our vicinity. It was then misfortune overtook them. For several days the vessel was wedged fast in the ice, drifting they knew not where, owing to the snow-mist that prevailed all the time.

On January 10 a violent gale from the south arose and compressed the ice in the Erebus and Terror gulfs. The ice-blocks were piled higher and higher all around the long-suffering vessel; the stern was forced upwards more than 4 feet. Then there came a huge block of ice, loftier than the others, and with a long projecting ice-foot under the surface of the water. This monster struck the ship from beneath and broke the keel, tore up the bottom planking, bent the propeller-shaft, and so severely compressed the after-part that its timbers gave way and let in floods of water. The condition of the vessel and of those who manned her was now become desperate. All the pumps were brought into requisition, and everything was made ready for leaving her at the shortest notice, if need arose.

The end, however, was not to be yet. For upwards of a month

efforts were made persistently and continuously, both day and night, in the first place to get the vessel off the ice that had rammed her, and to stop the leak as successfully as might be, and subsequently to escape from the drifting ice, and, if all came to all, to run the vessel on to some shore, where her furniture, the food, and the collections might be brought into safety. All in vain, however. It proved impossible to use the engine, and with sails alone the ship was unmanageable in waters so crowded with ice. Finally, on February 12, it became clear that all hope was at an end. The vessel was moored to an ice-floe, everything that might come in useful was transferred from her on to the floe, the Swedish flag was hoisted, the moorings were let go, and all stood silently watching how the gallant ship, that had braved so many hard tussles with hustling ice and boisterous waves in polar seas both north and south, slowly and solemnly sank into her watery grave.

They now resolved to make for Paulet island, which, besides being the land nearest to their temporary refuge on the ice-floe, had also the reputation of being well supplied with both seals and penguins. The distance that separated them from the island was not more than 25 miles, yet it took them no less than 16 whole days and nights to reach it, though they laboured to the very utmost of their strength the whole time. Three large boats and an exceedingly heavy consignment of goods had to be dragged along across very uneven ice; occasionally they had to cross drifting floes at the mercy of the currents. The worst part of it was, that the whole sheet of ice was in motion, so that it happened sometimes that they were drifted out during the night a greater distance than they had succeeded in advancing during the day.

At last, on February 28, they arrived at an open lead under the shore. The boats were hastily stocked with everything they could carry, while the remainder of the cargo was piled up on the ice. In that manner they succeeded in setting foot upon shore. They were intending on the following day to row out and fetch the pile of possessions they had left on the ice, but unfortunately during the night a gale sprang up, which dispersed the ice in all directions, and they had to rest content with having saved themselves and the few things they had had with them.

Now they were obliged to turn their attention to using the brief period of good weather that still remained to such profit as to provide themselves with a dwelling-place and with food before winter set in. A house was erected with double walls of stone, and with a roof consisting of a couple of sails and some sealskins. Penguins there were great quantities of, but, unluckily, the seals were not so plentiful, and their paucity was a serious matter, as they were so badly needed to yield blubber for fuel. It is an important thing to bear in mind that for purposes of heating the penguins are totally useless. By reason of their

having such a scanty stock of fuel, they were reduced to only cooking once a day throughout the winter.

Time passed but slowly for them under such trying circumstances, with so many hardships to endure, and their spirits were naturally still further depressed when one of their number, the young sailor Wenersgaard, fell ill with some affection of the heart, to which he very shortly afterwards succumbed. In the sombre darkness of the depth of an Antarctic winter, he was laid to his rest beneath a stone cairn upon the shore.

But I will not stay to describe in detail the uneventfulness of that long and weary winter existence, but will rather pass on to the return of activity with the approach of spring. When the sun made its reappearance and began by degrees to climb higher and higher in the sky as day followed day, the penguins returned upon the scene, and the monotonous world around woke to fresh life. The first eggs that were available afforded an immense treat and were duly appreciated. By the close of October the ice had disappeared to such an extent that a boat could be launched. Larsen at once set off for our station, where he had turned up just at the right moment.

Amid, and in spite of, all the difficulties that their position entailed, they had nevertheless carried out a number of scientific tasks, as was the case, too, at Dr. Andersson's station. Of special interest are the meteorological readings which they registered, from the fact that they form so valuable a link between those taken contemporaneously at Snow Hill and in Scotia bay. In spite of the short distance, the average temperature on Paulet island seems to be several degrees higher than at Snow Hill.

There now remained nothing for us to do but to make all haste to get ready for embarking on board the *Uruguay*, so that she might proceed to Paulet island and bring off those of his crew whom Captain Larsen had left behind there. In the afternoon of November 10 we took leave of the spot where we had spent such a long time. Our feelings were not exclusively those of joy and happiness at being privileged once more to return to our friends and relatives at home; we could not altogether repress sensations of melancholy and regret at parting with the home we had called our own so long.

In the bustle of getting ready to depart, I had not found time for any sleep for a couple of nights, and the first on board was of brief duration, for I was anxious not to miss the impression that the approach to Paulet island affords. We rounded the last headland and came in sight of the island at about 4 o'clock on a brilliant summer's morning, with the sun just rising in the south-east. All of a sudden the unwonted sound of the vessel's steam-whistle rings upon the ears. Its effect is almost instantaneous, for we can observe how our long-lost comrades, twelve in number, who were doubtless lying dreaming of the

longed-for relief which they thought yet so far away, come hurrying out of the heap of stones which had constituted their abode, to find out whence the strange and all-but-forgotten noise comes from, before they are willing to allow wild hopes to arise in their breasts.

A few hours later we were all collected on the deck of the *Uruguay*, and a week afterwards were walking about in the verdant forests of Tierra del Fuego, with butterflies flitting around us, flowers blossoming at our feet, and birds singing above our heads. On November 23, the telegraph from Santa Cruz was able to convey the news of our safety and rescue to those at home.

It now only remains for me to touch upon the scientific features of our expedition. The time at my disposal, however, does not allow me to attempt to give a comprehensive survey of our results, more especially as reference has been made in the foregoing narrative to the kinds of work we were engaged upon from time to time and in our several localities, and also as I have already found occasion to deal with several points in connection with our work in the February issue of the *Geographical Journal*.

Besides the extensive researches carried out in South Georgia, and also in the Falklands and Tierra del Fuego, as well as in the seas around and between those pieces of land, and in addition to the meteorological and magnetical work pursued with regularity at our stations during two years, the interest of which I need hardly dwell upon in this assembly, the chief significance of the work of our expedition, geographically, lies, I take it, in the circumstance that we had an opportunity of studying the whole of the district in its separate zones so completely, that it should now be possible, not only to establish a detailed comparison between it and the American continent, but also to obtain a definite starting-point for all future Antarctic research work in that hemisphere.

The whole of the mainland, and the majority of the islands lying nearest to it, have been mapped from the 66th parallel of south latitude and in connection with the area investigated by the Belgian Expedition. Furthermore, the seas that encompass those lands have been studied as regards their hydrography and their biology. Of our more detailed work the geological researches must be regarded as the most important.

The discovery of two fossil floras, one from the Jurassic period and one Tertiary, and the finding of richly fossiliferous marine deposits from both Cretaceous and Tertiary, lend a unique interest to this region, which will scarcely be surpassed by any other. If it is also remembered how favourable is the position which the region occupies, and what possibilities arise from the, comparatively speaking, extensive areas to be found here that are free from snow, it can scarcely be doubted that future expeditions will also here find plenty of scope for investigation and research.

Before the reading of the paper, the PRESIDENT said: We have the very great pleasure this evening of welcoming among us a very distinguished Swedish geographer who has lately, after suffering great hardships during over two years, returned home, bringing with him a very rich harvest of scientific results. A little over two years ago we wished him "God speed," and hoped to have seen him again in another year and a half, but, owing to the destruction of his ship and to other fatalities, he had to pass a second winter in that terrible climate, enabling him to perfect, to some extent, the scientific results which he has brought home, and which you will find, when he addresses you, are of exceptional importance. I now request Dr. Otto Nordenskiöld to address the meeting.

After the reading of the paper, the PRESIDENT said: His Excellency the Minister of Sweden and Norway will kindly address a few words to the meeting on the subject of this paper.

The SWEDISH MINISTER (Baron de BILDT): The kind reception extended in this country to my gallant and distinguished countryman Dr. Otto Nordenskiöld will, I am sure, awaken in our Swedish country a most sympathetic response. Our satisfaction at the way Dr. Nordenskiöld has been received here will be intensified by our knowledge that his work—I trust you will allow me to call it his magnificent work — that that work has been undertaken, to a certain extent, in co-operation with Englishmen. I need hardly tell you, but I would like to repeat it, that there is no name that appeals more mightily to us, your Scandinavian kinsmen across the sea, than the name of England, not only because England, to us a nation of seafarers, represents all that is most renowned in seamanship, but also because the name of England is synonymous with freedom, culture, and progress. We are proud of the work that Dr. Nordenskiöld has done in the Antarctic regions, but we are also glad and happy to think that he has riveted a new link in the traditional chain of sympathy that unites us to you Englishmen, and we trust and hope another link will soon be added, because we hope for the speedy and safe return of his fellow-expedition in the *Discovery*.

Lieut. SHACKLETON: I have not very much to say. I never reckoned, when I came home, I was going to do this sort of thing. All I can say is, I have a certain amount of interest in Dr. Nordenskiöld, apart from his gallant work in the *Antarctic*, because Captain Irizar, the naval officer who relieved him there, came to us to learn all about it. He knew nothing about Antarctic work before, but he soon got so familiar with the terms, such as "pack," that he afterwards said, on an occasion when he was late for an appointment, that he had been caught in the "pack" of Bond Street. Though an Antarctic explorer, I am not a very old one, so I leave any observation on the scientific part of the work to men who are far more capable of speaking about it than myself. I am very glad Dr. Nordenskiöld is here to-night, because he is a man who has a famous name, and is the nephew of another who is the only one who ever got from Europe through the Behring strait—Prof. Nordenskiöld.

The PRESIDENT: I am afraid Dr. Nordenskiöld's work has not yet been presented in a complete form, but still we are informed certainly that Jurassic flora has been discovered, and that it is identical with the Jurassic flora of India, and therefore I feel sure Dr. Blanford will be able to throw some light upon it.

Dr. BLANFORD: I can only congratulate Dr. Nordenskiöld on having made an eventful discovery. It is well known that one of the most interesting points, a point to which we all looked forward in Antarctic discovery, was to find land-plants on the Antarctic continent, for two reasons—because of the enormous importance of ascertaining whether in the far south, as in the far north, climates at an earlier period of the Earth's history were very much milder than they are at

present, and this, I think, has been done; and also because any plants that were discovered would afford considerable aid in tracing the distribution of land in past times. It will be remembered that within the Arctic regions floras of different geological ages occur. Tertiary plants have been found in abundance; Jurassic have also been recorded; even as far north, I think, as Smith's Sound plants have been discovered precisely similar to some of those found in Europe and North America. We know that quite recently there has been a glacial epoch which has cooled the whole surface of the Earth—I do not think there can be any doubt that the whole of the Earth's surface was cooled—but it is also evident that at certain times in the past the temperature was so much higher than in the present day, that even in the Arctic and Antarctic regions vegetable life flourished. And it must be remembered that plants give a clearer intimation of past climates than animals in general do, because those portions of the animals which testify to the climate under which they existed have for the most part disappeared, whilst there is sufficient remaining of the plants to show under what climatic conditions they must have lived.

The other and extremely interesting point is that of the evidence afforded by plants of land-connections in various directions. I have no doubt that Dr. Nordenskiöld's eminent fellow-countrymen, to whom we are indebted for so many palæo-botanical discoveries, will clearly trace out the relations between these plant-fossils and those found in other parts of the world.

The PRESIDENT: It now remains for us to thank Dr. Nordenskiöld for the extremely interesting evening he has given us. It would be difficult to have listened to a more interesting narrative than that which he has told us, with hairbreadth escapes of the people on board the *Antarctic*, the terrible winter on Paulet island and Bransfield sound. We have all listened, I am sure, with great interest to his own work. He has told his story most modestly; but we can discern, from what he has told us, how zealously and how steadily he and his companions have worked throughout the whole of that long period. Hourly their observations have been taken; day by day they have searched in every direction to increase the value of their biological and geological collections, and the results are far-reaching and important, for I think there can now be little doubt that through their fossil discoveries they have at length established the fact, which was not much doubted before, but of which there was no proof—the fact that on that Antarctic continent, as in Arctic lands, there was once a warm tropical climate, and that also we may go further and say that he has probably established another fact—the connection of the Antarctic lands with South America. We must, therefore, congratulate our friend that his long and tedious work has been crowned with a most remarkable degree of success, and that he has come home bringing back most important scientific results. I am sure the meeting will join with me in voting to Dr. Nordenskiöld our most hearty and cordial thanks for what he has told us this evening.

Dr. NORDENSKIÖLD: I return my deeply felt thanks to Sir Clements Markham and to the Royal Geographical Society for the reception that they have given me this evening, for those kind words addressed to me, and for the great patience with which you have listened to my contribution. I am well aware that I have not been able to make it so interesting as I might, neither the narrative of our fortunes nor of our scientific results as a whole; but I hope I may be able to come back later, or perhaps in writing give you a fuller description of the work than what I have been able to do now.

A JOURNEY THROUGH NORTHERN UGANDA.*

By Major P. H. G. POWELL-COTTON.

I GOT my caravan together at Mombasa, and, starting on February 22, 1902, went up the Uganda railway to Stony Athi station. Our route† lay across the thorn-dotted Athi plain and along the western side of Mount Doinyo Sabuk, on whose grassy slopes the eye could follow the course of many streams, marked by the band of trees and scrub that edged their beds. Then, fording the Athi and Thika rivers, we left their shady banks to cross a succession of grassy plains till the

MOUNT SIRGOI, GWASHENGESHU PLATEAU.

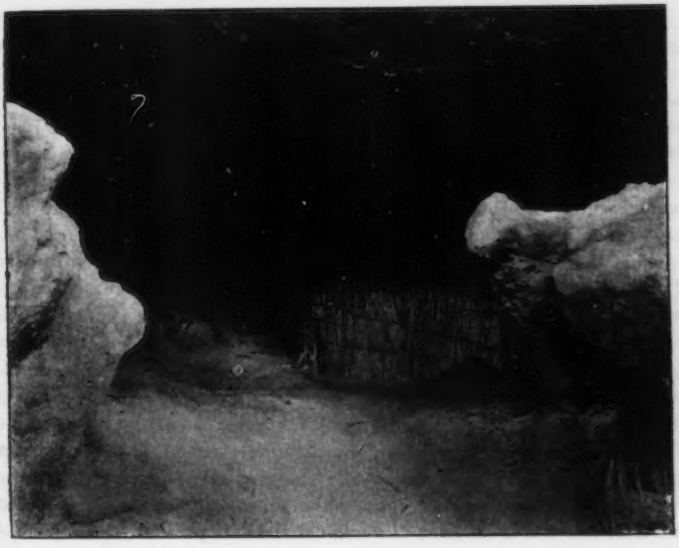
Tithara was reached, beyond which the country grows more hilly and villages are numerous.

At Mbirri, or Fort Hall, as it is officially called, we strengthened our caravan before proceeding north-west through a thickly populated district of the Kikuyu country. This region is well watered and very fertile. In every valley we passed extensive stretches of banana and sugar-cane cultivation, while along the slopes lay fields of Indian corn and other cereals, interspersed with occasional patches of tobacco. The villages were generally hidden in dense vegetation, no doubt with a

* Read at the Royal Geographical Society, February 22, 1904. Map, p. 128.

† This is fully described by Captain B. Dickson, R.A., in the *Journal* for January, 1903.

view to concealment from the eye of possible raiders. From here we made our way to the western slopes of Mount Kenya, across a rolling grass plain, which at that time of year (April) was almost devoid of game. Camping at an elevation of 6900 feet, in the long grass on the edge of the forest which clothes the lower slopes of the mountain, we spent some time in a vain attempt to find bull elephants. We pushed our way through the dense belt of jungle which forms the outer edge, and entered a primeval forest, where perpetual twilight and an impressive stillness reigned. As we rose higher, the forest gave place to bamboo brakes, and at an elevation of 8900 feet I noticed the first tree lobelias (*Lobelia Deckeni?*), which are from 10 to 12 feet in height.



INTERIOR OF CAVE, MOUNT ELGON.

When, however, we had climbed to an altitude of 9400 feet, and found ourselves still in the midst of thick bamboo, with no recent signs of elephant, we determined to turn back without having reached the rocky slopes which we had examined with the telescope from our camp.

We now set our faces westwards through a series of washouts, cut deeply into rotten sandstone and mud. Nearly the whole way across the plains of Laikipia the country was well wooded and appeared to be an ideal district for cattle-grazing, judging from the vast herds of antelope, apparently in the pink of condition, that roamed over it; while the belts of trees and little copses would provide a plentiful supply of timber and firewood. Crossing the Marmanet hills that

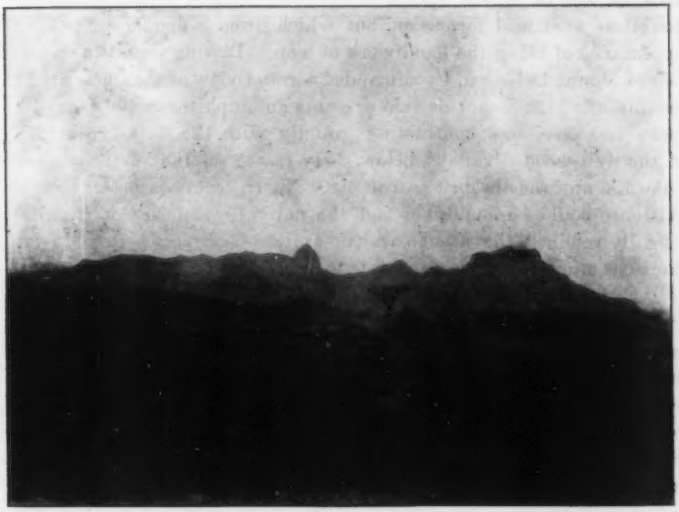
form the watershed between the tributaries of the Gwaso Nyiro (which, flowing northwards and then eastwards, loses itself in the Lorian swamp) and the inland basin of Lake Baringo, we passed through a tract of forest land extending to the edge of the escarpment. This steep declivity, which forms the western edge of the great plateau lying at the foot of Mount Kenya, descends to the plain in three great steps or terraces, making in all a drop of some 2800 feet. A winding path led us over these terraces, down slopes covered with thorn-trees, to the Baringo basin below. I spent some two months in the neighbourhood of the lake, the water of which is quite fresh, even close in shore, except at the southern end, where, when a north wind is blowing, the mud brought in by the river Molo is stirred up.

Nearly in the centre of the southern half of Lake Baringo lies a little group of islands, on the eastern side of the largest of which a number of hot springs extend down to and under the surface of the lake. In all there are nearly fifty; the water in the largest is so beautifully clear that, although 20 feet in depth, you can see the bubbles rising from the bottom. Some of the smaller ones throw out only an intermittent jet, while others are continually on the boil. I found the water, which has but a very slight smell of sulphur, useful to cook my dinner in. Among the tumbled rocks of the hillside, behind the springs, there is a steam blow-hole, which hisses and booms continually. The neighbourhood of the springs is a favourite resort of the hippo, with which the lake abounds. Whether volcanic agency is responsible for the considerable fluctuations in the level of the bed of the lake in recent years, I am unable to say. The natives report that at times the steam blow-hole is very much more active, while the hot-water springs throw up jets incessantly. Judging by the water-mark along the eastern shore, the level must, at some comparatively recent date, have been much higher than at present, while the partially submerged trees on the island prove that either these have sunk, or that the water has at one time receded to an even lower level than its present one. Some of the older natives told me that they could remember the time when it was possible to walk from the southern shore of the lake to the islands, where now there is comparatively deep water. On the other hand, the north end is said to be much shallower than formerly. The lake swarms with crocodile, but they are so mild-mannered that, when my companion, Mr. Cobb, stepped on one, it merely wriggled out of the way.

At Baringo Mr. Cobb left me on his return to England, while I marched south-west to the Ravine station. From there I followed the route so fully described by Mr. A. C. Hollis in the January number of the *Journal*, through the Mau forest, across the Gwashengeshu plateau, to Mount Sirgoi, or, more correctly speaking, Mount Sirgoit. For a considerable distance round the mountain the plain is covered with fine pasture, which is kept cropped by the numerous

herds of game in the district. To the north-east, situated in an abrupt dip in the plain, is a small salt lake, fed by a fresh-water stream. During my stay of nearly a month in this district, I had the opportunity of examining a number of the stone ruins mentioned by Mr. Hollis, but cannot agree with his description of their shape, as all those I found were circular, or nearly so, some 30 to 50 yards in diameter, and built of large unhewn stones, often at a very considerable distance from any apparent outcrop of rock. As a rule, they are situated on the top, or on the slopes, of rising ground; the interiors are dish-shaped, and contain smaller circular walls marking the sites of the old huts.

After entering the thorn country to the north-west in search of



ROCK CONE PEAK, MUROSOKA.

giraffe, I turned southwards, and made my way to the Government station at Mumia's, whence I visited the cave-dwellers on the eastern slopes of Mount Elgon. I was fortunate enough to find several groups of caves still inhabited, and was able to examine the homes and mode of life of the Wongabuney, as well as to get a number of photos of them. From Sir Harry Johnston's description, I had expected to find the inspection of these caves anything but an enjoyable experience, owing to their alleged filthy state. I was, therefore, agreeably surprised at the absence of fleas and at the general cleanliness, which was far greater than in most of the native villages. The interior of the caves is very irregular, as the harder part of the rock has been left jutting out in most inconvenient corners, while the softer stone has

been cut away. That the whole inside surface of these caves has been hewn by the hand of man I have no manner of doubt, but the present owners are quite incapable of having executed such a stupendous task, and have apparently no knowledge of who the actual workers were. I think that a systematic examination of a number of these caves would result in some interesting light being thrown on their original inhabitants.

Following the mountain northwards, I crossed the Kiboko river. It is to this perennial stream that the Karamoja bring their herds and flocks for many days' journey from the north in the dry season. Between this river and Mount Debasien there are several cone-shaped hills, on one of which stands a curiously shaped monolith, which is doubtless a natural formation, but which, from a distance, has all the appearance of being the handiwork of man. Passing round the western side of Mount Debasien, I commanded a grand view of this most striking mountain, which from this side presents an amphitheatre of jagged red rocks and precipices, contrasting grandly with the dark-green foliage of the well-wooded valleys below. My search on the northern side for Lake Kagato was absolutely fruitless. No trace of its present or past existence could be found, nor had the natives ever heard of it. When I finally rejoined the usual caravan route, which passes to the east of the mountain, I turned northwards towards the Karamojo plateau.

At Murlinga, a place visited by Colonel Macdonald's expedition, I was obliged to spend some time procuring a fresh supply of donkeys and flour, and from here I made a day's march to the neighbourhood of the striking group of hills, Kizima, Kamalinga, and Nopak, which lie to the south-west. The two former have been rent asunder from top to bottom, the sheer sides leaving but a narrow rift between them, while the northern flank of Nopak and the western flank of Kizima present almost unbroken walls of rock. They are said to be uninhabited, and, in fact, no traces of either villages or cultivation were observable. On the way to Mount Moroto, in a north-easterly direction, I passed several large dams, which the Karamoja construct in this part of the country to collect and hold the small streams of water which flow only during the rains. These were now nearly dry, and I met whole villages setting out on their march southwards to the Kiboko river.

My camp was pitched in the Lea valley, at the foot of Mount Moroto, in order that I might visit the Tepeth, a curious tribe who only inhabit the top of this mountain and of Debasien. Their huts are two-storeyed, the only examples I have seen of such dwellings among African tribes. Although they are numerically very weak in comparison to the Karamoja of the plains, and, owing to the higher altitude at which they live, are able to raise corn and find grass for their flocks when the plains are parched with drought, they are held in such respect by the latter on account of their supposed magical

powers that they are never molested. At first they were extremely suspicious of my intentions, and even more so of my camera; but when I took to butterfly-catching, they apparently concluded that I must be harmless, and so I was able to secure some pictures of them and of their dwellings.

At the southern extremity of the mountain I crossed a low spur, which formed a narrow divide between the streams flowing to Lake Kirkpatrick and those which go to feed the Turkwel. An abrupt descent of over 2000 feet from the Karamoja plateau led me into a large valley which drains into the Nakokoh, a tributary of the Turkwel. The northern flank of Moroto was formed by a great wall of rock, over

NEAR THE TARASH RIVER, TURKANA.

which two fine waterfalls gushed. Striking across the western side of this valley, I searched the eastern slopes of Murosoka for the head-waters of the Tarash, which are marked on the map as rising on that side, but found that the whole of the drainage flowed towards the Turkwel. At that time of year the region was practically waterless, except for a few pools far apart, hidden in the clefts of the rocks. These were very difficult to discover without a local guide, whom we had not been able to obtain, as the country was quite deserted. After a good deal of fruitless search, during which I lost one man, while the rest of my party suffered severely from thirst, I at last found a road over the hilltop, and struck a tributary of the Tarash river, which cut through

a rocky gorge at the foot of the western side of the mountain. This soon led me into the Tarash valley, where the dry bed of the stream was from 50 to 150 yards in width. The valley was populated by Turkana, who owned large herds and flocks, and drew their water-supply from pits sunk in the sandy bed of the river. For three days I continued along the valley in a north-westerly direction, the elevation being between 2300 and 2500 feet. I then visited another valley, lying one day's journey due west, whence I again returned to the Tarash at a point further north, and, after following it for a day, struck off north-north-west to Mt. Zunut, while the river trended north-east. The natives reported that, within four days' journey, the Tarash reached a lake or swamp, called Loarding, which also received three other rivers, and that, during the rains, a big river carried the overflow waters to Basso (one of the many native names of Lake Rudolf).

At the foot of Mount Zunut lay a series of brackish pools, and in the neighbourhood the ground was dotted for miles with elephants' bones. Following the range, as it trended west-north-west, I crossed a low pass into a plain, called by the Toposa, Kotane, and to the north-west of it we found water at the foot of Mount Locorina. We again made across the plain in a south-westerly direction, left Mount Marangole slightly to the east, and traversed a low pass on its north-western flank: this led us into a broken country of small hills and ridges, extending in a westerly direction to the foot of the Dodinga hills. Here we drank running water for the first time since leaving the Kiboko river at the north of Mount Elgon, for hitherto we had had to content ourselves with pools in the clefts of rock, pits sunk in the sandy beds of rivers, or brackish puddles fouled by every beast for miles round. The south-eastern end of the Dodinga hills is bounded by Mount Lotuke, which is uninhabited. Mount Lokinya, about half-way along the range, forms the limit of the country occupied by the Dodinga race towards the north-west, the remainder of the chain of hills being inhabited by a tribe called the Oboya, who are in close relationship with the Dodinga. The hills consist of three parallel ridges running approximately north-west and south-east, and are intersected by numerous small precipitous valleys densely wooded. The villages are situated on the hilltops and on the shoulders of the upper slopes, the elevation being nearly 6000 feet, or 3000 above the plain below. On the low passes amongst the hills I noticed little cairns of quartz, of which rock there are numerous outcrops.

Descending the Dodinga hills to the south-west, I marched for three days across a plain covered with coarse grass and scattered thorn-trees to the river Kedef. Along the banks stretched a belt of country covered with sweet grass, palm trees, and thickets of tropical vegetation. It was a splendid grazing-ground, and was visited by every sort of animal found in that district. The sandy bed of the stream was from

LOBU VALLEY, MOUNT EGADANG.

70 to 200 yards in width, water being found in clay pockets along its edge. This was the first river I had come across that flowed direct to the Nile. One day's journey south-west brought me to Mount Cartebong, where I met an independent hill tribe called the Mielli, the first natives I had met with in the possession of firearms. They had extensive and well-cultivated fields at the foot of the mountain, and they derived their water-supply from rocky pools in the bed of a stream rising near the top. Their villages were perched on the upper slopes, and approached by steep, narrow paths, easily defended against an invader.

After a three days' journey in a north-westerly direction along the valley of the Kedef, or Kedepo, as the Mielli call it, I turned due west into the Lori valley, which stretches from the eastern slopes of Mount Egadang. It was a beautiful little fertile valley, watered by the stream from which it takes its name. Hills almost surrounded it, and the villages were dotted about the lower slopes of the twin peaks called Lourruer. Beyond the shoulder of the mountain lay another cultivated valley called Lobu. This was not so much shut in as the Lori, and the villages here were situated at the foot, not on the slopes, of the mountain. My route now lay past Mount Lohido to Obira, through much cultivated ground, with villages scattered here and there on the hillsides. From there I marched to Logguren, the present headquarters of Limoroo, the Latuka chief. His own village was situated at the foot of an isolated mass of rock, the sides of which were so steep that I could

not walk up it without assistance, although it is dotted with groups of huts built on ingeniously devised platforms. The whole country round was thickly populated, great stretches of cultivation surrounding the villages, while the flocks found pasturage further afield. From here I made my way in a south-westerly direction along the lower slopes of that mass of mountains which is topped by Agoro. The way for the most part lay through well-timbered country, with tracts of swampy ground and tall reeds, following the courses of the numerous small streams. I spent some time hunting elephant at Obbo, on the upper waters of the Gomoro river, and then reached the Nile at the mouth of the Assua, across which an iron ferry-boat has been established. From there to Nimule the Nile flows through a series of narrow rocky channels, the tumbling water forming the most picturesque bit of scenery I saw in the 1400 odd miles of the river's course which I traversed.

From Nimule I marched to Wadelai along a wretched track, having to cross numerous unbridged streams, the depth of which varied from a foot or two to over a man's head. At Wadelai I passed to the western bank, and proceeded southwards to the Congo Free State station of Mahagi, which I found situated five hours from the shore of Lake Albert, at the foot of the main ridge. Here considerable progress was being made in the making of roads, the bridging of streams, and the construction of rest-houses for travellers. On my return to Wadelai,

A LATUKA VILLAGE AT LOGGUREN.

I was fortunate enough to get a passage in one of the two Uganda Government sailing-boats to Nimule, whence I marched to Gondokoro along an even worse path than that between Nimule and Wadelai. At Gondokoro I caught the monthly Sudan Government steamer to Khartum, and found the 1081 miles one of the most monotonous journeys I had ever undertaken, owing to the papyrus and long grass, which absolutely shut out all view. The hearty welcome accorded us, and the progress to be seen, first at the Congo Free State, and then at the Sudan Government stations, formed the only bright spots on the way.

BATHYMETRICAL SURVEY OF THE FRESH-WATER LOCHS OF SCOTLAND.*

Under the Direction of Sir JOHN MURRAY, K.C.B., F.R.S., D.Sc., etc., and LAURENCE PULLAR, F.R.S.E.

Part V.—Lochs of the Morar Basin.

By Dr. T. N. Johnston.

In this paper it is proposed to deal with the results obtained by the Lake Survey in the fresh-water lochs lying in the basin of the river Morar, viz. Loch Morar, Loch Beoraid, and Loch an Nostarie. There were a number of other small lochs in this catchment basin, but as there were no boats on them, they could not be surveyed. Loch Morar is the principal loch in the basin, and it gives great interest to the whole area from the fact that it is not only the deepest lake in Scotland, but in the British Islands; indeed, the bottom of this loch forms the deepest hole in the continental plateau on which our islands are situated.

From the accompanying sketch-map (Fig. 1), it will be seen that Lochs Morar and Beoraid are parallel to each other, and run in an east-and-west direction. The overflow from Loch Beoraid, which lies about 3 miles to the south of Loch Morar, enters Loch Morar about its centre by the river Meoble, while the overflow from Loch an Nostarie, which lies to the north, enters Loch Morar at its western end by the river Loin.

The west end of Loch Morar is only about 500 or 600 yards from

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* During the present season six or seven members of the Lake Survey staff will be engaged in the detailed study of the chemical, physical, and biological conditions of Loch Ness, and Prof. Bachmann, of Lucerne, Prof. Wesenburg-Lund, of Denmark, and other foreign naturalists, are expected to take part in the investigations.

The larger Scottish lochs have all been surveyed, and several members of the Lake Survey staff are now engaged in sounding the smaller lochs throughout the country. Much difficulty is being experienced in getting boats to the smaller hill lochs, and Sir John Murray will feel much obliged to any highland or other proprietors or tenants who can assist him and his staff in the survey of these remote lochs. Plates, p. 128.

the sea, and its outflow is by the river Morar, which in its course falls over a rocky barrier, at the foot of which is a famous salmon pool.

The total drainage area of the Morar basin is calculated at 42,000 acres, or over 65½ square miles. The whole region is rocky and mountainous. The district has not yet been mapped by the Geological Survey, but it is believed that the whole basin lies entirely in the crystalline schists of the Moine series of the Geological Survey, the

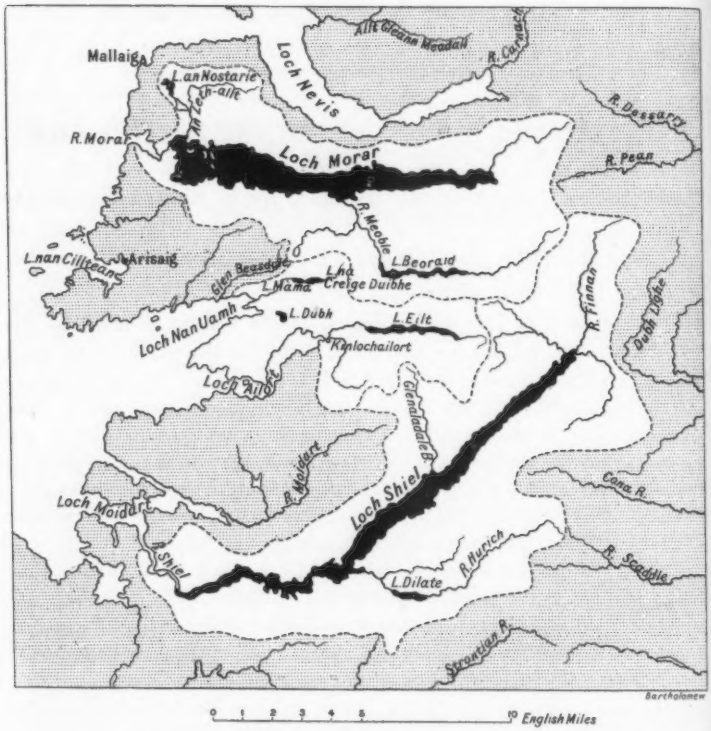


FIG. 1.—INDEX MAP OF THE MORAR AND SHIEL BASINS.

main strike being north-north-east to south-south-west. The rocks seen at the barrier at the mouth of the loch are composed of hard quartzose flagstones or siliceous Moine schists. The direction of the hills at the belt which separates Loch Morar from the sea agrees generally with the strike of the rocks. Lochs Morar and Beoraid occupy true rock basins, but it seems almost certain that the outlet of Loch Morar was at one time to the south-west, because the col there does not rise more than 100 feet above the sea, and there is a

narrow belt of comparatively flat ground running southwards towards the source of the burn called Allt Cam Carach. It will be observed, by an examination of the depth map, that the deep water at the west end of the loch runs in the direction of this flat ground. Some deep borings along this flat ground might lead to interesting results.

Loch Morar (as well as Loch Beoraid) is a glen-lake which lies in a transverse valley—that is to say, in a valley the direction of which is independent of the geological structure of the region and crosses irregularly the strike of the rocks. This fact very probably accounts for the steep sides and the great depth to which the valley has been scooped out. Should the country be depressed about 40 feet, Loch Morar would be converted into a submerged valley and an arm of the sea like Loch Etive. By some observers it is held that the great depth of Loch Morar precludes the idea that it was scooped out by river-action or by ice.

Loch Morar (see Plate I.).—This is a large and beautiful loch, lying amid wild and magnificent scenery on the west coast of Inverness-shire, in the south-west portion of that county, immediately to the south of Loch Nevis, which is a sea-loch running inland for 12 miles from the Sound of Sleat. The west end of Loch Morar is about 3 miles from Arisaig, and $2\frac{1}{2}$ miles from Mallaig. Morar station, on the Mallaig branch of the West Highland Railway, is within a few hundred yards of the west end.

The loch is a little over $11\frac{1}{2}$ miles in length, and the maximum breadth is over $1\frac{1}{2}$ miles near the west end; the mean breadth is nearly $\frac{9}{10}$ of a mile, or about $7\frac{1}{2}$ per cent. of the length. The area covered by the lake is 6596 acres, or nearly $10\frac{1}{3}$ square miles.

There are several islands, more or less richly covered with vegetation at the west end of the loch (see Fig. 2), and parts of the surrounding land, especially on the north side, are fairly well wooded, all of which greatly adds to the beauty and picturesqueness of the scenery at this part, but as one proceeds eastwards towards the head of the loch the scenery becomes wilder, the vegetation more scanty, and the mountains on both sides of the loch rise higher and more steeply. At many places on the north shore they rise precipitously from the water's edge, and around the head of the loch they reach a height of fully 3000 feet.

Loch Morar is fed by numerous small burns and streams, the largest feeder being the Meoble river, which, issuing from Loch Beoraid, falls in, after a course of about 3 miles, at "Camas Luinge," a bay on the south shore.

On the north shore, about $4\frac{1}{2}$ miles from the head of the loch, is a large bay called "South Tarbet bay," and here a narrow neck of land about half a mile wide separates Loch Nevis from Loch Morar. A track which runs up the north shore of Loch Morar to Tarbet on Loch Nevis, crosses this neck of land by a narrow pass which rises to a height

of 200 feet. For a distance of about 6 miles from the west end, the loch gradually narrows until a breadth of two-thirds of a mile is attained a little to the east of Brinacory island on the north shore, then it expands again to a breadth of over a mile opposite the entrance of the Meoble river; gradually it narrows again until at its eastern end the breadth is about one-third of a mile.

Depth of the Loch.—For a long time Loch Ness bore the reputation of being the deepest loch in Scotland, but in the year 1879 Mr. J. Y. Buchanan, F.R.S., showed that Loch Morar contained depths of over 1000 feet, which was deeper by several hundred feet than Loch Ness.

FIG. 2.—LOCH MORAR, LOOKING EAST FROM THE WEST END.
(*Photo by T. N. Johnston.*)

In April, 1887, Sir John Murray took a series of eighteen soundings down the centre of the loch, the greatest depth recorded being 1050 feet. In September of the same year he again took twelve soundings at the deepest part of the loch, the greatest depth obtained being 1026 feet. All these soundings were taken by means of hempen-rope sounding-lines, as well as those taken in 1892 by Dr. Thomas Scott, who recorded a depth of 1020 feet. In June, 1896, Sir John Murray and the late Mr. Fred. P. Pullar made a bathymetrical survey of the whole loch with a wire-rope machine, but the chart they prepared was not published, as it was found that the machine employed was untrustworthy. It was therefore resolved to make a completely new survey. This was carried out in June and July, 1902, by Dr. Johnston, Messrs. Garrett, Hewitt,

Parsons, and James Murray. Since that date the loch has been frequently visited by members of the Lake Survey staff for the purpose of taking temperatures and making biological observations.

The surface of the loch at the time the survey was made, in June, 1902, was 30·5 feet above sea-level, and in March, 1903, the level was found to be 35 feet above the sea—a difference in level of 4½ feet. Altogether eleven hundred soundings were taken in the loch, or about one hundred soundings to the square mile; the maximum depth recorded was 1017 feet. This is less than previous results, but is to be accounted for by the use of wire rope, which nearly always gives a lesser depth than the soundings with ordinary sounding-lines. The general results are set forth on the accompanying map of the loch, with various cross-sections.

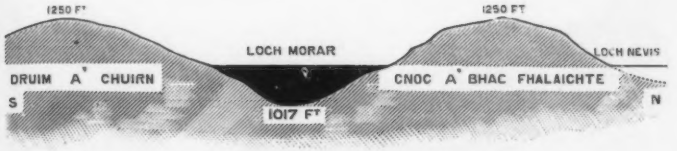


FIG. 3.—DIAGRAMMATIC SECTION ACROSS LOCH MORAR AND THE HILLS ON BOTH SIDES, SHOWING RELATION OF DEPTH TO HEIGHT. NATURAL SCALE.

Loch Morar is of simple conformation, the bottom falling on all sides down to the deepest part, but with here and there a few minor undulations of the lake-floor, especially in the wider western half of the loch, where the contour-lines of depth are much more sinuous in character than in the narrower eastern half. This is most noticeable in the vicinity of the islands at the west end; the line of soundings running south from Rudha Port na Coite shows several irregularities of the lake-floor, and causes the 300-feet and 500-feet contours to twist in a peculiar manner. Proceeding eastwards, the bottom undulates in such a way as to cut up the 700-feet basin into three portions separated from each other by shallower water, and towards the north shore, opposite Camas na Togalach, a sounding of 367 feet is recorded separated from the main basin by a shoaling of the bottom covered by 229 feet of water. Farther east, again, opposite Roinn a' Ghiubhais, the bottom shoals slightly, so as to isolate a small area exceeding 900 feet in depth from the main 900-feet basin. Opposite the entrance of the river Meoble, on the southern shore, a sounding of 97 feet was recorded comparatively near shore, which gives rise to a prolongation of the 100-feet contour-line in that direction. Towards the east end of the loch, opposite Sròn an Drutain on the north shore, a rise of the bottom was observed covered by 74 feet of water, surrounded by depths exceeding 100 feet.

The deepest part of the loch is at the wide portion opposite the mouth of the Meoble river; here, in the centre of the loch, the maximum

depth of 1017 feet was obtained, at a spot nearly midway between the two ends of the loch. The area over 1000 feet in depth is not large, extending only to a little over 4 acres. One sounding of 1002 feet was obtained about 400 yards to the north-east of this area.

The area enclosed by the 900-feet contour extends to a length of a little over 2 miles, with a maximum breadth of a quarter of a mile, situated about $5\frac{1}{2}$ miles from the west end of the loch and 4 miles from the east end. A small detached area over 900 feet in depth, with a length of half a mile, lies about two-thirds of a mile to the west of the main 900-feet basin.

FIG. 4.—LOCH MORAR, LOOKING TOWARDS THE DEEPEST PART.
(*Photo by J. A. Harvie-Brown, F.Z.S.*)

The 800-feet contour encloses an area 4 miles in length with a maximum breadth of about one-third of a mile. It extends from 4 miles from the west end of the loch to within 3 miles of the east end.

There are three depressions over 700 feet in depth. The main one is nearly 5 miles in length, with a maximum breadth of two-fifths of a mile, extending from nearly 4 miles from the west end of the loch to within $2\frac{1}{2}$ miles of the east end. The other two depressions are small; one lies about half a mile to the west of the main depression, and is three-quarters of a mile in length; close to its western extremity lies the third depression, which has a length of about one-third of a mile.

The 600-feet contour encloses an area which is $7\frac{1}{2}$ miles in length,

extending from about 2 miles from the west end of the loch to 2 miles from the east end.

The 500-feet contour encloses an area extending to over $7\frac{1}{2}$ miles in length, reaching from $1\frac{2}{3}$ miles from the west end of the loch to about 2 miles from the east end.

The 400-feet contour encloses an area over $8\frac{1}{3}$ miles in length, extending from $1\frac{1}{2}$ miles from the west end to 1 mile from the east end of the loch.

The area over 300 feet in depth is $9\frac{1}{2}$ miles in length, extending from nearly $1\frac{1}{2}$ miles from the west end to a little over half a mile from the east end of the loch. There is a small detached area of over 300 feet in depth, about 5 acres in extent, near the north shore, a quarter of a mile to the west of Brinacory island.

The area enclosed by the 200-feet contour is nearly $10\frac{1}{3}$ miles in length, extending from about a mile from the west end to about one-sixth of a mile from the east end of the loch.

The area enclosed by the 100-feet contour is over 11 miles in length, extending from one-fifth of a mile from the west end of the loch to a short distance from the east end.

The area covered by less than 100 feet of water is 2784 acres. The areas between the consecutive contour-lines and the percentages to the total area of the loch are as follows:—

Feet.	Acres.	Per cent.
0 to 100	2784 ...	42·2
100 „ 200	863 ...	13·1
200 „ 300	528 ...	8·0
300 „ 400	488 ...	7·4
400 „ 500	331 ...	5·0
500 „ 600	331 ...	5·0
600 „ 700	547 ...	8·3
700 „ 800	111 ...	1·7
800 „ 900	530 ...	8·0
900 „ 1000	79 ...	1·2
over 1000	4 ...	0·1
	6596	100·0

These contour-lines of depth approach each other very closely in many places, showing that the slopes are very steep at these points. A little to the west of the promontory called "Rudha nam Faiseachean" on the south shore, south-east of the islands, this is very marked, the slope being as much as 1 in $2\frac{1}{2}$. Farther east on the south shore, off "Eilean Allmhara," the slope is again very steep, as it also is off Brinacory island, which lies almost opposite on the north shore.

As the surface of the loch is only 30 feet above sea-level, almost the entire bed of the loch is below the level of the sea. The area draining directly into Loch Morar is over 33,800 acres, or about 52 square miles.

The volume of water contained in the loch is estimated at

81,486,000,000 cubic feet, and the mean depth at 284 feet. Although Loch Morar is the deepest loch, Loch Ness has a volume three times as great, and its mean depth is 436 feet.

The deepest Scottish lochs next to Loch Morar are—

Loch Ness	... ...	751 feet.
„ Lomond	... ...	623 „
„ Lochy	... ...	531 „
„ Ericht	... ...	512 „
„ Tay	... ...	508 „

In the sea to the west of Morar there is no depth approaching 1000 feet, with the exception of a deep spot of 834 feet (139 fathoms) between the islands of Rum and Skye, so that to get a depth of 1000 feet one must go west of St. Kilda and Ireland, beyond the 100-fathoms line in the Atlantic ocean. There are no depths comparable to this in the North sea, but the submarine valley known as the "Norwegian Gut," which runs round the west and south coast of Norway, is remarkably deep, depths of 1794 feet (299 fathoms) and 1710 feet (285 fathoms) having been obtained at the part called "The Sleeve."

There are seven lakes on the continent of Europe which exceed Loch Morar in maximum depth, and in the following table their maximum depths, heights of the water surface above sea-level, and depths of their floors below sea-level, are shown as compared with Loch Morar. The first four of these lakes are in Norway, the other three are well-known Italian lakes.*

Name.	Max. depth.	Height above sea-level.	Depth below sea-level.
	Feet.	Feet.	Feet.
Hornisdalsvand	1594·5	167·3	1427·2
Mjösen	1482·9	396·9	1086·0
Salsvatn	1460·0	42·6	1417·4
Tinnsjö	1437·0	606·9	830·1
Como	1341·8	652·9	688·9
Maggiore	1220·4	472·4	748·0
Garda	1135·1	213·2	921·9
Morar	1017·0	30·5	986·5

The Lake of Geneva, in which very important and comprehensive limnological work has been done by Prof. Forel, Dr. Ed. Sarasin, and others, has a maximum depth of 1013·8 feet, and the height of the water surface is 1220·4 feet above sea-level; the deepest part of the lake-floor does not, therefore, go below sea-level, but lies at 206·6 feet above it.

Temperature Observations.—A large number of observations on the temperature of the water of Loch Morar have been made in various

* The figures referring to these continental lakes are derived from "Halbfass, Die Morphometrie der Europäischen Seen," *Zeitschr. Gesellsch. Erdk. Berlin*, Jahrg. 1903, p. 592; 1904, p. 204.

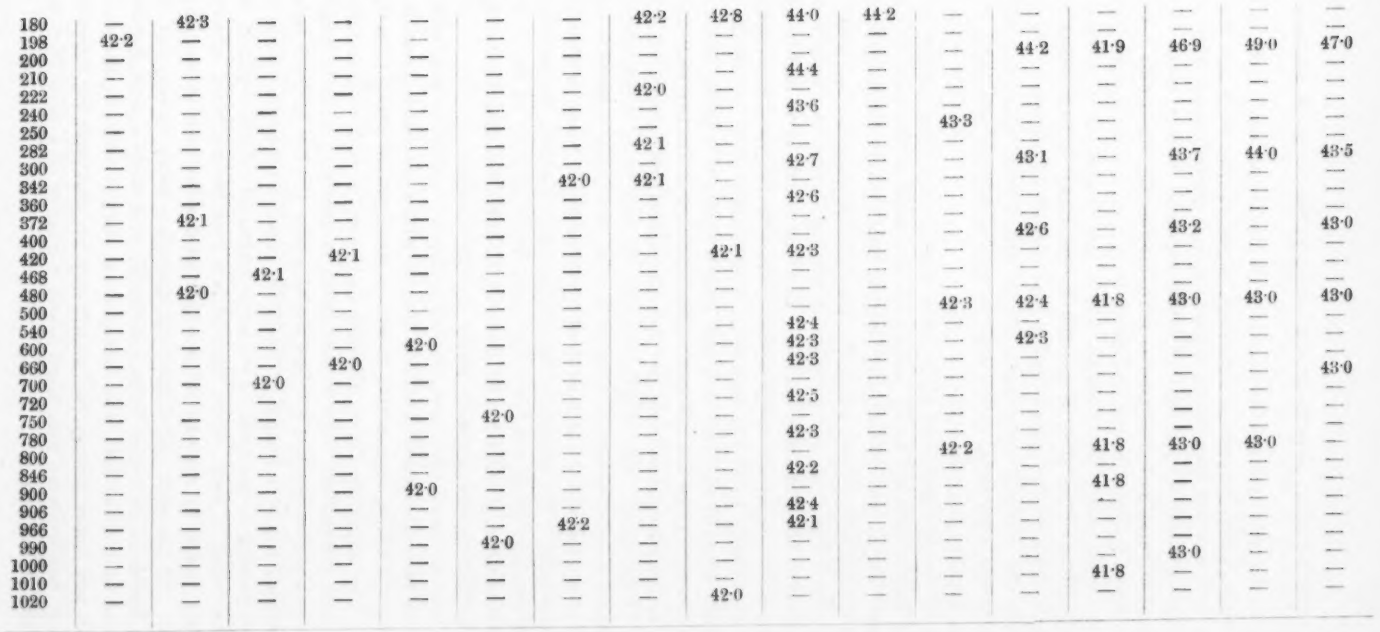
seasons and in different years. On April 29 and September 3, 1887, Sir John Murray took several series of temperatures, ranging from the surface to the bottom. In the April observations the temperature varied from 43°·9 at the surface to 42°·0 at the bottom, a range of 1°·9, and in September the variation was from 57°·8 at the surface to 42°·1 at the bottom, a range of 15°·7. On July 2 and 3, 1902, serial temperatures were taken by the Lake Survey, and the variation was from 55°·2 at the surface to 42°·2 at the bottom, a range of 13°·0. Subsequently, on March 28, 1903, the temperature was found to be practically uniform from the surface to the bottom at a depth of 1010 feet, the

FIG. 5.—FALLS OF MORAR.
(*Photo by T. N. Johnston.*)

surface temperature being 41°·9, while that at the bottom was 41°·8, a range of only 0°·1, and on October 23 of the same year the variation was from 50°·2 at the surface to 43°·0 at the bottom in 1000 feet, a range of 7°·2. The temperature at the depth of 1000 feet has generally been regarded as fairly constant at about 42°·0 all the year round, with a variation of about 0°·2, and this higher record of 43°·0 may be due to the increased amount of water draining into the loch during the wet summer of 1903. The highest surface temperature recorded was one of 59°·2 on June 30, 1902, off Bracora, the air-temperature at the time being 62°·8, with a moderate westerly breeze. This gives a total range of 17°·4 between the highest surface and the lowest bottom temperature recorded.

TEMPERATURES RECORDED IN LOCH MORAR.

Date ...	29/4/87.	29/4/87.	29/4/87.	29/4/87.	29/4/87.	29/4/87.	29/4/87.	29/4/87.	29/4/87.	3/9/87	3/9/87	2/7/02	3/7/02	26/3/03	23/10/03	23/10/03	23/10/03
Position	South of islands near centre of west basin.	¾-mile E. of islands centre of loch.	Between Inverbeg and Letter-morar.	¼ mile W. of line between Brinacory island and Almhara.	About 1½ miles E. of last position.	Little W. of line between Sword-land and mouth of Meoble R.	1 mile E. of Tarbet, centre of loch.	Within 1 mile of east end of loch.	Between Tarbet Point and Cruch Dubh au Rindhe Fheâne.	Off Tarbet, nearly halfway across.	Off Tarbet.	Off Wester Sword-land.	E. of islands.	Off Meoble	Off Meoble	Off Roma-saig.	Off Letter-morar.
Hour ...	8.45 a.m.	9.10 a.m.	9.45 a.m.	—	10.55 a.m.	11.30 a.m.	12.30 p.m.	2.50 p.m.	4.30 p.m.	9.5 a.m.	—	6 p.m.	8 a.m.	10.30 a.m.	1 p.m.	2.30 p.m.	4 p.m.
Wind ...	E. 2.	E. 3.	E. 3.	E. 2.	E. 3.	E. 3.	E. 3.	E. 2.	E. 1.	W. 3.	—	—	S. light.	S.E. fresh.	N.W. moderate.	N.W. strong.	N.W. moderate.
Temp. of air	—	—	—	—	—	—	—	—	—	—	—	55°·2	55°·0	41°·5	56°·0	49°·5	49°·5
Depth.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.
0 ft.	43·1	42·9	43·1	—	—	—	43·4	43·9	43·5	57·8	—	55·2	54·6	41·9	50·2	50·2	50·0
5	—	—	—	—	—	—	—	—	—	—	—	—	54·6	—	—	—	—
6	—	—	—	43·4	43·8	43·1	43·5	—	43·3	—	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—	—	—	—	—	54·5	54·7	—	—	—	—
18	—	—	—	—	—	—	—	43·7	43·1	—	—	—	—	—	—	—	—
20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30	—	—	—	—	—	—	—	43·5	—	57·9	—	—	53·0	—	—	—	—
48	42·9	—	—	—	—	—	—	—	—	58·0	—	—	—	—	—	—	—
50	—	—	—	—	—	—	—	—	—	—	—	51·6	50·5	—	50·0	—	—
60	—	42·6	—	—	—	—	—	43·0	43·0	57·6	57·8	49·1	—	—	—	—	—
75	—	—	—	—	—	—	—	—	—	—	—	48·0	—	—	—	—	—
78	—	—	—	—	—	—	—	—	—	57·6	—	—	—	—	—	—	—
90	—	—	—	—	—	—	—	42·6	—	51·0	52·0	—	—	—	—	—	—
100	—	—	—	—	—	—	—	—	—	—	—	47·0	47·3	41·9	50·0	50·0	50·0
108	—	—	—	—	—	—	—	—	—	52·1	—	—	—	—	—	—	—
120	—	42·3	—	—	—	—	—	42·3	43·0	46·8	47·0	—	—	—	—	—	—
150	—	—	—	—	—	—	—	—	—	54·3	45·6	45·0	—	—	—	—	—
162	—	—	—	—	—	—	—	—	—	—	44·8	—	—	—	—	—	—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43·0
43·0
43·0
43·0
49·0
44·0
43·0
43·0
47·0
43·5
43·0
43·0
43·0

The deposits covering the floor of Loch Morar are mostly dark brown in colour, which becomes almost black in the deeper parts. A sample from 1000 feet was dark brown when wet, and greyish-black when dry, containing about 50 per cent. of black vegetable matter, about 10 per cent. of mineral particles (quartz, mica, hornblende, etc.), with a mean diameter of 0·15 millimetre, and about 40 per cent. of amorphous clayey matter, with many fine Diatoms and a few fragments of arenaceous Foraminifera. The mica is present in extremely minute flakes, and imperceptible to the naked eye in the unwashed material. In this respect the material from Loch Morar differs from that obtained in most of the other lochs, in the samples from which the glistening mica flakes attract one's attention.

Loch Beoraid (see Plate II.).—Loch Beoraid is a long narrow loch, lying amidst wild and rocky scenery about 3 miles to the south of Loch Morar. There were no Ordnance Survey bench-marks available in the vicinity of the loch from which the level of the water surface could be ascertained, but from the position of the spot-levels, the height was estimated at 168 feet above the sea. The loch trends in an east-to-west direction, and is fed by numerous small burns, the largest, Allt a Ghlinne Dhuinn, flowing in at the east end. The Meoble river, which drains the loch, issues at the west end, and, after a course of 3 miles, falls into Loch Morar. There are one or two small islands at the east end of the loch, and one large one lying in the centre, almost equidistant from both ends of the loch. The length of Loch Beoraid is $3\frac{1}{2}$ miles, and its maximum breadth about one-third of a mile; the mean breadth is one-sixth of a mile, and the area covered by water is 352 acres, or over half a square mile. The number of soundings taken was 120, the maximum depth obtained being 159 feet; the mean depth is over 72 feet. The volume of water is estimated at 1,156,000,000 cubic feet, and the drainage area extends to 7680 acres, or nearly 12 square miles.

There are two basins over 100 feet in depth; one at the west end of the loch three-quarters of a mile in length, with a maximum breadth of one-sixth of a mile, approaching to within one-eighth of a mile from that end. The maximum depth obtained in it was 147 feet, comparatively very near the outflow. The eastern basin is nearly $1\frac{1}{4}$ miles in length, with a maximum depth of 159 feet, the area over 150 feet in depth being almost half a mile in length. The 50-feet area is continuous from end to end, passing to the south of the large central island, the depth in the channel being 53 feet. Loch Beoraid is a rock basin divided into two separate basins by a rocky ridge which crosses the loch at the large island. At the west end of the loch there is a rocky barrier, and the river Meoble in its course forms a waterfall over rocks a short distance from its exit. The loch was surveyed on July 1, 1902, by Messrs. J. Hewitt and James Murray, and at 4.30 p.m. on that date the following series of temperatures was taken about a quarter of a mile from the west end of the loch:—

Depth.	Temperature.
Surface	60°·0 Fahr.
10 feet	59·8 „
25 „	53·9 „
50 „	51·0 „
100 „	47·5 „
140 „	48·0 „

These temperatures show a range of 12°·5 from the surface to 100 feet, with a small inversion of half a degree between 100 and 140 feet. About 3 p.m. the surface temperature in the centre of the loch, half a mile from the east end, with a strong westerly breeze blowing, was found to be 61°·4.

Loch an Nostarie (see Plate III.).—Loch an Nostarie is a small loch lying about a mile to the north of the west end of Loch Morar, into which it drains through the little Loch a' Bhada Dharaich and the Allt an Lòin. It was surveyed on July 16, 1902, by Mr. Hewitt, when, by levelling from an Ordnance Survey bench-mark, the level of the water surface was found to be 89·3 feet above sea-level. The loch has a length of a little over half a mile, with a maximum breadth of nearly half a mile, the mean breadth being a quarter of a mile. The area covered by water extends to 90 acres, or nearly one-seventh of a square mile. The number of soundings taken was 62, the maximum depth being 35 feet, while the mean depth is very nearly 11 feet. The volume of water contained in the loch is estimated at 44,000,000 cubic feet, and the drainage area extends to 1152 acres or 1¾ square miles. The loch is quite simple in conformation, the deep water occupying a central position. On the date of the survey the temperature of the water was found to be almost uniform from surface to bottom, the difference between the surface temperature and that at 30 feet being only 0°·1 Fahr., as shown by the following series taken at 4 p.m. in the deepest part of the loch:—

Depth.	Temperature.
Surface	59°·3 Fahr.
10 feet	59°·3 „
20 „	59°·2 „
30 „	59°·2 „

The details regarding the lochs dealt with in this paper are given in the table on p. 78.

NOTES ON THE BIOLOGY OF LOCH MORAR.

By JAMES MURRAY.

Salmon, sea-trout, and loch-trout abound in Loch Morar, and the sport is frequently very good, but the salmon as a rule are "dour" to rise. Charr and the powan, or fresh-water herring (*Coregonus*), are said to inhabit the loch.

The biology of Loch Morar offers several peculiarities as compared with most of the other large Scottish lochs. The quantity of plankton is small, the larger

Loch.	Height above sea. Feet.	Number of sound-ings.	Length in miles.	Breadth in miles.		Mean breadth per cent. of length.	Depth.			Ratio of depth to length.		Volume in millions cubic feet.	Area of Loch. Square miles.	Drainage area.	
				Max.	Mean.		Max. Feet.	Mean. Feet.	Mean per cent. of max.	Max.	Mean.			Total in square miles.	Ratio to area of loch.
Morar	30·5	1102	11·68	1·60	0·88	7·53	1017	284·0	27·9	61	217	81,486	10·30	65·63	6·37
Beoraid	168·0	120	3·43	0·32	0·16	4·70	159	72·3	45 5	114	250	1156	0·55	11·85	21·54
Nostarie	89·3	62	0·56	0·48	0·25	44·60	35	10·95	31·3	84	270	44	0·14	1·79	12·78
		1284										82,686	10·99	65·63 *	6·0

* The drainage area of Morar includes those of Beoraid and Nostarie.

Entomostraca especially being deficient. With this is correlated an unusual clearness of the water (a white disc was visible in June at a depth of 42 feet). The plankton hardly varies throughout the year, except that *Leptodora*, *Bythotrephes*, *Holopedium*, and a few other genera appear in the summer months only. The quantity was slightly greater in March than at other seasons. At no season has *Daphnia* been observed in the loch, and its absence has also been noted by Dr. Thomas Scott (as long ago as 1892) and by Mr. D. J. Scourfield. This is more remarkable as *Daphnia* abounds in Loch an Nostarie, about a mile distant, and discharging into Loch Morar by a considerable stream. The only *Diaptomus* was the common *D. gracilis*; while many of the other large lochs in about the same latitude have also one or other of that group of closely related species represented in Loch Ness by *D. laticeps*. The *Bosmina* was the typical *B. longispina*, and not *B. obtusirostris*, which is the common species in the majority of the Scottish lochs. In contradistinction to the scarcity of larger organisms, many very small species were abundant. Desmids especially, of a few species, were unusually numerous in the plankton at all seasons. A remarkable variety of *Xanthidium subhastiferum* has been described by Messrs. West from material collected by the Lake Survey. In this the two spines of each side of the semi-cell, instead of lying in the same plane as the semi-cell, are placed side by side on the external angles of the wedge-shaped semi-cell.

The aquatic plants, growing in the shallow water among the islands, yielded an abundant fauna of microscopic animals, especially of Rotifera and Tardigrada. From among these there will shortly be described two new species of Bdelloid Rotifers. A new water-bear of the genus *Echiniscus* will also be described. It is distinguished chiefly by having the dorsal plates covered by a large hexagonal reticulation in addition to the usual dots. This species was very numerous in October, and has not yet been met with elsewhere.

ADMIRALTY SURVEYS DURING THE YEAR 1903.

By Admiral Sir W. J. L. WHARTON, K.C.B., F.R.S., Hydrographer.

UNDER the orders of the Lords Commissioners of the Admiralty, eight of His Majesty's vessels, with three small hired steam-vessels, manned by 78 officers and 703 men, have been employed on hydrographical surveys on the home and foreign stations. The following is a brief summary of the work accomplished, as detailed in the report prepared for presentation to Parliament:—

Reports of 344 rocks and shoals which were dangerous to navigation have been received at the Hydrographic Department, and were notified to the public by Notices to Mariners; 627 miles of coast have been charted, and an area of 20,467 square miles has been sounded.

In *Great Britain* various resurveys were made.

In *England*, at Portsmouth and Plymouth much close resurveying was done. At Dover a close re-examination was made of the soundings in the bay, with careful observations of the tidal streams, with a view to ascertaining if the progress of the harbour works had any influence on their set. Various re-examinations in the ever-changing Thames estuary were carried out. East Dudgeon shoal and Triton knoll were examined; the former has extended, and was traced as a ridge until it joins the Dudgeon shoal.

Tidal observations by means of a newly invented pneumatic tide apparatus were obtained in the North sea. Very fairly marked tidal curves were obtained on Brown ridge, Swarte bank, and Dogger bank. The curve on Brown ridge

verified an observation made by Captain Hewett, R.N., in 1840—that in this position the vertical movement of the tide is only about 2 feet. On all the banks the range was less than on the nearest shore. It is hoped that these observations may be extended in future years.

Looe and Teignmouth were resurveyed. At the latter place the depths on the bar vary with every breeze of wind. Padstow was surveyed, and great changes were found in the banks and channels. Two shoal places were found nearly a mile south of the Dodman, which enforces the need of closer surveys than have hitherto been made.

In *Scotland*, Loch Eriboll and Gair loch were surveyed, and Stornoway (partly). In Moray firth the survey was continued from Burgh head, and completed as far as Buckie, besides large-scale plans of Hopeman, Lossiemouth, and Buckie (partly). At East Loch Roag further observations were made of the interesting magnetic shoal.

In *Ireland*, Queenstown survey was completed. Crookhaven was surveyed, and numerous shoals were discovered in Ballydivlin bay. Youghal harbour survey was taken in hand, and will be finished next year.

In *Newfoundland*, the survey of the bay of Exploits was continued, and a portion between Northern arm and Bay point on the west, and Burnt arm and Brown arm on the east was finished. A series of soundings immediately off the eastern approach to Belle Isle strait and in the outer part of the approach was obtained, which will aid vessels in finding their position in a fog.

An unexpected bank was found in the centre line of approach, which will create anxiety if struck by the lead, as it will appear as if the ship is near the shore.

In *British Columbia*, soundings were obtained in the approaches to the Strait of Juan de Fuca, completing the work carried out in the two previous seasons. The survey on the south-east coast of Vancouver island between Sidney and Cadboro' point was finished. The survey of the North channel to Queen Charlotte's sound was nearly finished, and plans were made of Blunden harbour and the Southgate group of islands. The survey of Nanoose bay was also begun.

On the *West Coast of Africa*, Old Calabar river and its approaches were surveyed, and a plan made of Duke Town anchorage. Observations were obtained in the strength of the Guinea current to ascertain its depth. It appears not to reach below 45 fathoms, diminishing to 15 fathoms as the shore is approached. A shoal off the Bissagos islands, in the main line of traffic to the Cape Colony, reported by the s.s. *Ruapehu*, was searched for without success, and has now been removed from the charts.

In the *China seas* two ships were at work. The West Lamma channel at Hong Kong and a portion of the waters from Putoi islands to the westward were surveyed. The survey of Mirs bay near Hong Kong was continued. The survey of the British sphere of influence on the Shantung coast was resumed, and the portion from 3½ miles east of Kimin island round the promontory to 1 mile south of Ears rock was finished, and plans were made of Actæon and Swallow coves, as well as of Rocky, Litau, and Aylen bays. 3910 miles of soundings were obtained on the outer part of the great bank which stretches off the coast to the north of the island Shaweishan, at the mouth of the Yangtse, without any dangers being discovered.

In *Australasia*, on the east coast of North island, New Zealand, 115 miles of coast-line has been surveyed from Te Para to East Cape, and soundings were obtained over an area of 1370 square miles in the vicinity of the coast. The entrance channel to Port Nicholson was surveyed. The survey of the east coast of North island from Cape Runaway to the southward is now in hand. During

the search for a 5-fathom shoal, reported by the *Star of Bengal* situated in the open Pacific, 410 miles N. 50° E. from Auckland, an extensive submerged ridge 27 miles long was found to have depths over it from 300 to 100 fathoms, coral. The frequent rips which were seen on this ridge may have given rise to the reported shoal. In Tasmania, Hunter passage on the north-west coast was surveyed, assistance being obtained from the Tasmanian Land Office. A portion of the inner route to Torres strait was surveyed to the southward of Cook town, between Monk House and Rattlesnake points, including a part of the passage to the outer barrier reef.

The surveying ships maintained by the *Indian Government* continued the survey from Chittagong to the southward on the Arakan coast, and a plan was made of Naaf river. At the Andaman islands plans were made of Port Meadows and Kotara harbour. A survey of Mayu is in progress, and on the Tenasserim coast the entrance and approach of Henzé basin are also being surveyed.

During 1903 the Hydrographic Department has published 144 charts and plans, and 48 new plans have been added to the existing plates. The number of charts printed to meet demands has, during the year, amounted to 520,898.

REVIEWS.

EUROPE.

Cvijić's Geological Atlas of Macedonia and Old Servia.

'Geologischer Atlas von Makedonien und Altserbien.' Von Jovan Cvijić. 8 Blätter in Imperial-Format. Lithog. der Staatsdruckerei.—Ausgabe der Akademie der Wissenschaften. Belgrade, 1903.

Following on the large limnological atlas of last year, there now comes this no less valuable carthographic work, embodying, in eight large sheets, the geological researches of the Servian scholar in fields of such manifold present interest. Two of the maps are already known in the inner circles of specialists, as supplements to the official reports of the Vienna Academy. Here new light is shed on them by the six complementary cartographical sheets. The two in question are the "tectonic" maps (1 : 1,200,000): one, of the frontier territory between the so-called "ancient mass" and the younger Dinaric and Albano-Greek folds; the other, of the Dinaro-Albanian *Scharuńg*.

They have already been noticed in this *Journal* (June, 1902, pp. 735–737) in a manner appreciative of their importance. To the geologist, and no less to the geographer with a previous geological training, the most important sheet in the whole work now completed will be the geological map of the entire territory on the large scale of 1 : 500,000. A comparison with hitherto existing representations of the geological formations around the Dessaretic lakes, and in the Vardar and Struma valleys, illustrates for the first time the scope and value of the progress towards a knowledge of these lands attained through the investigations of the Servian scholar. The variously coloured print brings out in clear and distinct discrimination geological structures of twenty-two different ages and characters. They are described in Servian and French. Among them the geographer will particularly prize the detailed subdivision of the alluvial deposits, as the strata immediately preceding our era. Cvijić here distinguishes "Calcaires lacustres," "Tufs calcaires," "moraines," and "sédiments fluvio-glaciaires." Three sheets with fifteen geological profiles supply, in vertical section, the necessary complement to this ground-plan and the data necessary to a thorough interpretation of

the folding and deposition, the dislocations and basin-formations of the land. Most of the profiles are on the scale of 1 : 200,000, with five-fold vertical exaggeration; several on the scale of 1 : 100,000. The detached eastern section "From Kilia on the Black Sea to the Bosphorus" is on the scale of 1 : 50,000. The very complete definition of the strata by symbols indicates the species of rock; the colour, in harmony with the map; and the formation. The description is in Servian and German.

Of especial interest to geographers and cartographers is the large sheet devoted to the history of the development of the cartographical representation of the Balkan peninsula. It contains twelve facsimilies of general maps, ranging from Abraham Ortelius (sixteenth century) down to the one in Stieler's Hand-atlas, dating from the middle of the nineteenth century. Besides the above, maps interesting on account of their authorship are those of Sanson (1692) and of Buache (1744). They well illustrate the tenacity of the geographical conception that the Dinaric range (in Croatia and Bosnia), the Sardagh in Old Servia, and the Balkan (in Bulgaria) constituted one continuous mountain chain. A small map giving a synopsis of the learned author's travels forms the conclusion of the important work, the accompanying text of which is likewise in part being set up in type.

The Nearest East—Two Points of View.

'Through the Lands of the Serb.' By Mary E. Durham. Edward Arnold. 1904. Pp. ix., 345. *With a Map.*

'The Balkans from Within.' By Reginald Wyon. Finch & Co. 1904. Pp. xviii., 475. *With Two Maps.*

The scope of these two admirable volumes is not wholly the same; their purposes are wholly dissimilar. Yet inasmuch as from the geographical standpoint they have the same interest, it is justifiable and instructive to consider them together. Mr. Wyon covers the whole ground from the Golden Horn to the Montenegrin border; he travelled, under the fullest protection that could be afforded him, as a correspondent; those responsible for his safety in the several countries he visited having the proper conception of the value of a hair of his head. Miss Durham, on the other hand, adventured herself in Servia and Montenegro, and even Albania, trusting to her sex and to the application of the proverbial *noblesse oblige*. In part of her travels, moreover, ignorance was bliss; for there can be no doubt that she adventured more dangerously than she knew. Certainly the woman traveller was accepted where no ordinary male would have made his way unscathed. Her journey as such is the more praiseworthy.

Mr. Wyon was, of course, intent on bloodshed, on wars and rumours of wars; and though in his series of vivid sketches of things seen the political aspect of his subject is not often insisted upon, it is always present to the mind. Nor is this aspect wholly neglected by Miss Durham. Setting aside political considerations, so to write, in the concrete form, a question of abstract political geography is forced upon the imagination by both these books. We see in the mind's eye the tourist who would become a traveller casting all his ambitions from him as he tries to enter Belgrade in the same casual manner in which he would alight at the Gare du Nord. The line of demarcation here, between the West and the nearest East, is the most remarkable unnatural line which the political geographer has to draw. Under different conditions (say, the existence of a strong coherent power in Greece) it would never have been drawn. But being drawn, it preserves, and will long preserve (to judge from the books before us), this wonderful picture of races in infancy —of men who are of full age in childhood and children in manhood, whose abstract

gods are friendship and enmity. We find Mr. Wyon writing of "a European" as distinct from the native of this region. It is to him, the native, that both writers devote their chief attention, viewing them under opposite conditions, but arriving at precisely similar conclusions. The geographical interest of both books centres upon the Albanian and the Montenegrin.

The volumes are well illustrated, but the illustrations, like the text, are concerned with the people rather than the physical attributes of the country. Both, however, have a few striking word-pictures of the little-known scenic wonders of the region; and how far the travellers were at times fulfilling the *rôle* of explorers may be gathered from the frequency with which they were dependent for knowledge of a journey's length on the native estimate in hours, which generally sadly overestimated the capacity of the foreigner. Mr. Wyon was once wholly lost in the Rilo mountains. Miss Durham's excellent descriptions of the towns she visited, and her archæological notes and drawings, are noteworthy features of her work.

O. J. R. H.

ASIA.

Persian Ornithology.

'The Birds of Eastern Persia: Ornithological Results of an Excursion made in 1898.' By G. N. Zarudnyi. St. Petersburg: 1903. (Memoirs of the Russian Geographical Society, for General Geography, vol. xxxvi. part 2; Russian.)

The geographical portion of this journey was described in the first part of the same volume of the 'Memoirs,' as well as in a communication to the Memoirs of the St. Petersburg Academy of Sciences (x., No. 1); while the birds of the Transcaspian region were described by the same author in 'Materials for the Knowledge of the Flora and the Fauna of Russia,' part ii. In the present work the learned ornithologist gives the description of the species of birds which he met, and of which he brought specimens. Only a few species have been added on the authority of Dr. Blanford ('Eastern Persia,' vol. ii.) and Dr. Aitchison ('The Zoology of the Afghan Delimitation Commission'). N. Zarudnyi considers that it would be premature to draw any general conclusions concerning the bird fauna of Persia, in connection with other portions of the Iran plateau and the Turan lowlands, so long as large portions of Afghanistan and Central Persia remain unexplored; he therefore simply describes the 421 species of birds which are known from Eastern Persia, giving notes about their habits and the localities they were found in, and showing their distribution over six districts, into which he subdivides Eastern Persia.

Korea.

'Korea.' By Angus Hamilton. London: Heinemann. 1904.

This is a book full of interest. The journeys made by the author include a trip to the German mines at Tongkoku, and another to the Diamond mountains, of which Mrs. Bishop has written an earlier description, and add but little to our geographical knowledge of Korea. But the charm of the book lies especially in the freshness of treatment and fulness of detail with which each subject is presented, and in the opportune information regarding the political situation in Korea almost up to the date of the outbreak of the war between Russia and Japan. The varying influence of Russia and Japan, the absence of British traders (though British manufactures had through Japanese pedlars secured a commanding position before Korea was opened by treaty to trade), the value of the harbours, the beauty of the land, and the love of its people for natural beauties, are each in turn represented by a happy pen supported by excellent illustrations. At the same time

there is much information regarding the peculiar customs of the country and the progress of foreign trade, especially at Chemulpo. An account is given of the various foreign mining enterprises, and in the appendix are full tables of statistics of trade.

Mr. Hamilton is justly eloquent on the good work done by Mr. J. McLeavy Brown, C.M.G., the Inspector-General of Customs, and writes very interestingly on the present queen and the minister, Yi Yong-ik, whose rise from the lowest condition to the highest influence has been attended with vicissitudes the tale of which was not completed at the date of the volume. Some of the generalizations drawn by the author are doubtless at variance with the opinions of men who have lived longer in the country, but the picture of Korea at the close of 1900, and the history of the opposing interests of different nations, are attractively portrayed. One of the best portions of the book is the preface, which contains an excellent description of that part of Manchuria which is now the present scene of the war, together with particulars of the relative strength at sea and on land of the two nations then making ready for battle. W. R. C.

JAPAN.

'Impressions of Japan.' By G. H. Rittner. John Murray. 1904. Pp. xii., 223.
'Japan and Her People.' By Anna C. Hartshorne. Kegan Paul. 1904. In two volumes, encased. Pp. x., 377; vi., 374. *With a Map.*
'Japan: Das Land der Aufgehenden Sonne.' By Dr. Joseph Lauterer. Spamer, Leipzig. Pp. v., 407.

If these three works may be taken as an average of those called forth by present happenings, the comparison of treatment is not without interest. For here we have Japan as it impressed an Englishman and an American woman, and as a German has studied it. Mr. Rittner's work consists of a series of sketches on disconnected subjects, pleasantly written, and beautifully illustrated. Miss Hartshorne's book is on similar lines. A reader would find ample entertainment in either, even one who did not know where Japan is. Like the generality of books of "impressions," information as to the natural appearance of Japan practically confines itself to the two themes—the flowers and Fujiyama. In effect, both works should commend themselves to the casual traveller as efficient adjuncts to Murray's Handbook; and this is meant in no derogatory sense. Miss Hartshorne, for example, gives fragments of archæology and legend of high interest and erudition, but contrast what (it may be presumed) is demanded by the German reader. Dr. Lauterer's scientific study is veiled by an attempt, far less successful than the English, at picturesque binding, by photographs of scenery, geisha, and so forth; but in his first few pages is a chronological list of Japan's rulers from 660 B.C. He works through the entire history of Japan from that date until the present day, dividing it into eight periods. Philology, art, conditions of life, topography, geology, climatology, botany, flora, fauna, and a list of authorities —these subjects are handled in succession, and well handled; but the result, to be frank, reads something like a magnified telegram. This is typical of the practical German outlook. In England we have it not. The German geographical method has developed beyond ours, but it is a question whether a system of geography which calls forth a book attempting to crystallize all the conceivably kindred sciences, does not defeat its own ends by giving up all its claim to originality. O. J. R. H.

A Journey across Sumatra.

'Quer Durch Sumatra.' By Alfred Maass. Berlin: W. Süsserott. 1904. Pp. xii., 143. *With Two Maps.*

This is an interesting account of a journey of some 250 miles across the south-east of Sumatra, between Bangkoelen on the west coast and Palembang on the east. The route taken led nearly north from the start into the highlands of Padang, mounting the coastal range of Barisan, which appears on this the steep side of the island. It then struck down on to one of the streams feeding the river Moesi, and followed that stream down to Palembang. The book is properly prefaced with a short account of the history and physical appearance of Sumatra. The descriptions of scenery and native life are excellent, and the illustrations apposite and well produced from photographs. Of particular interest are those which show the handsome and fantastic domestic architecture of the better class of dwellings.

AMERICA.

Canada.

'Sport and Travel in the Northland of Canada.' By David T. Hanbury. Edward Arnold. 1904. Pp. xxxii., 319. *With Two Maps.*

This important work is decidedly mistitled, for the phrase "Sport and Travel" rather suggests a common type of travel-book, which simply relates acts, and has no scientific objective. On the contrary, Mr. Hanbury set out to explore, to collect new facts; and he fired his gun and drew his net less often as a sportsman than as a hunter by necessity. Nor was his work, as here set forth, topographical only. He brought home geological, faunal, and floral collections, with meteorological and ethnological data, to which reference must be made later. The course of his journey of 1901–2, to which previous journeys are here treated as merely introductory, was detailed in the *Journal* of December, 1902 (p. 655), and February, 1903 (p. 189); it will therefore suffice to indicate here that it led, roughly speaking, from Chesterfield inlet to the Arctic coast in 101° W., and along the coast (crossing Kent peninsula at its neck) to the mouth of the Coppermine river, and so by Great Bear lake to Fort Norman on the Mackenzie. He broke new ground in local journeys north of Chesterfield inlet and Baker lake, and, on his main route, from the point where he left the Ark-i-Linik river and crossed the height of land on his way to the coast. From here he descended Buchanan river through slightly undulating open country to Backs river and Lake Pelly (260 feet above sea-level), and continued thence northward through a very barren and rocky district. On the coastal journey the old surveys were found generally accurate, save that by crossing Kent peninsula instead of skirting round it, Mr. Hanbury found that large mass of land to be much more nearly insulated than was previously supposed, owing to the existence of a narrow-mouthed inlet, which had been missed by the coast surveyors. Having regard to the nature of the country traversed, it might have been well if Mr. Hanbury's route surveys on the newly explored portions of his journey could have been exhibited in greater detail, as the small scale of the topographical map provided does not enable the reader to follow the narrative closely upon it. Without this assistance it is not easy to appreciate in detail the physical characteristics of the land from the text, for these are never strongly marked individually. The land is one in which cartography could make clear much that neither verbal description nor photography can touch. The result is that the narrative in parts becomes little more than a diary of events, and somewhat lacks variety. But there is a general impression that, in writing, Mr. Hanbury minimizes his difficulties, and that therefore he is entitled to even greater credit than appears at first glance for the excellent scientific work set forth in a

series of appendices. As regards geology, Mr. Hanbury gives a synopsis of his observations, and Dr. J. S. Flett, F.G.S., identifies twenty-one rock specimens. There is, moreover, a geological map. In this connection, it may be noted that Mr. Hanbury collected ample proof of the richness of the copper deposits of the Arctic coast. Thus some natives met near the Fitzgerald islands, east of Kent peninsula, were rich in copper implements, and stated that some of their copper was obtained in Victoria Land across the strait, and some from the islands to the north; and the travellers found quantities at Lewis island in Bathurst inlet. An admirable coloured plate is provided to show the butterflies collected; while Mr. H. J. Elwes, F.R.S., who scientifically describes the specimens, states that "it is the most interesting collection I have yet seen," and that, "considering the difficulties under which collecting is carried on in such a region, and that Mr. Hanbury had not previously any experience in collecting, this collection does him the highest credit. Mr. R. A. Rolfe tabulates the botanical collection. A daily series of meteorological observations is given from September 22, 1901, to September 23, 1902, with wind and weather notes, and an almost complete list of maximum and minimum shade temperatures, which should be of the utmost value. Finally, there are measurements of a few Hudson bay and Arctic coast Eskimo, and an Eskimo vocabulary. A feature of the journey was the remarkably amicable relations between Mr. Hanbury and the Eskimo employed and encountered by him, and he has nothing but praise for them, contrasting their character strongly and very favourably with the Indians.

Lastly, an unscientific word may be allowed as regards the use of Eskimo geographical names. Mr. Hanbury is in favour of their retention, and this is in accordance with rightly recognized usage at the present day. But as regards the larger physical features of Northern Canada, and not a few of the smaller, previous explorers have not observed this. The giving of English names has gone so far as to suggest an argument against the present accepted custom, and the political status of the country might be adduced in support. Eskimo names are particularly unfamiliar and (if constantly hyphenated) unwieldy. Moreover, they make for additional chaos in geographical spelling—a chaos from which the map accompanying this volume has not been saved, so that there is the usual regrettable lack of uniformity in some cases. O. J. R. H.

The Orinoco Valley.

'A Naturalist in the Guianas.' By Eugène André, F.R.G.S. London: Smith, Elder & Co. 1904.

Few of the unexplored areas of South America possess greater attractions for the intrepid traveller than the one enclosed on the north and west by the river Orinoco, and on the south by the low Pacarima range of mountains, the eastern extension of which terminates at the mysterious dome of the demon-guarded Roraima, on the southern boundary of British Guiana. In the days when the Spanish *conquistador* inflamed the imagination of Europe with stories of a golden empire, accessible by the rivers of the region outlined, Ralegh sought for Manoa by the way of the Orinoco and Caura, and promised that "whatsoever Prince shall possess it, that Prince shall be Lorde of more Gold, and of a more beautifull Empire, and of more Cities and people, than eyther the king of Spayne, or the great Turke."

The Caura tributary of the Orinoco and its picturesque valley has recently been the field of the labours and perilous adventures which Mr. André vividly describes in the interesting volume under review. He gives the river a length of about 500 miles, and tells us that from the Waiomgomo indian settlement, at its

source, to the rapids of Mura, 400 miles down-stream, no human habitation is met. The whole distance is nothing but a wilderness and an interminable forest; but on the lower river there are extensive *llanos* diversified by narrow belts of woodland bordering the streams or pools of water. The whole forested region, especially during the rainy season, is infested by myriads of flies and clouds of gnats and mosquitoes. Immense flocks of cormorants are occasionally seen, and their repulsive and oily flesh sometimes serves as food for the people of the lower Caura.

Butterflies, nightjars, hawks, rice-birds, curassows, and trojons attract the facile pen of Mr. André and add to the charm of his book, while his remarks upon ants remind us of Belt's 'Naturalist in Nicaragua.' Pumas, tapirs, capabaras, and peccaries represent the larger forms of animal life, but are seldom met. The river abounds in fish; and alligators, electric eels, and caribes enliven its waters.

In the lower river are the rapids of Mura and Piritu, but in its middle course is a succession of cataracts called the Falls of Para. Here the land rises abruptly, some 800 feet, to a plateau about 1000 feet above sea-level, which in turn gradually ascends to 2000 feet, to the base of the Pacarima range.

It is interesting to note that, in Spanish colonial days, a line of fortified posts was erected along a road which the Spaniards opened between Esmeralds, on the upper Orinoco, and the Caura, by way of the rivers Padamo and Erewato; but all of these strongholds were destroyed in 1776 by an uprising of the indians, driven to revolt by the cruelties inflicted upon them by the garrisons. This military cordon was supposed to prevent incursions of the Caribs, that warlike people of which Padre Cassani so bitterly complained in 1741, when giving an account of the Jesuit missions on the Orinoco.

With a poorly equipped expedition of fourteen men and three boats, Mr. André started from La Prision, on the lower Caura, to explore the stream to its source. The difficulties encountered were formidable—the dense forest through which the river coursed, the thick tangle of undergrowth on its margins, the cataracts, rapids, and other obstructions to navigation, the appalling hordes of ants and swarms of different kinds of flies, the lack of proper food, and the debilitating, sickly climate gave the voyage such a desperate character that, on reaching Mount Amélia, near the source of the river, our explorer was forced to turn back. His largest boat was wrecked soon after at the Arichi rapid, and all of his botanical specimens, seeds, insects, samples of rock, writing-case, and journals were lost. Provisions for eight or ten days alone remained, game was scarce and not to be counted upon, a vast uninhabited and inhospitable wilderness had to be traversed, and starvation sat grinning at him from his two remaining canoes. These being too small to carry the entire party, five of his men undertook to reach the settlements down stream by walking 200 miles through the forests—they were never heard from afterwards. The remaining nine members of the expedition descended the river in the canoes, but such were their sufferings on the way that one of them died of starvation.

The thrilling account which Mr. André gives of the voyage recalls the fearful losses by hunger and exposure of Lieut. Strain's party, some fifty years ago, in its attempt to cross the isthmus of Panamá by an unknown route.

The wreck of Mr. Andre's boat was a sad loss to science, but the brave explorer must be congratulated that, despite his mishap, he has been able to produce a record of his travels replete with valuable scientific and descriptive *data* which add greatly to our knowledge of an important section of the Orinoco valley. Dr. Keltie, in his admirable preface to the author's volume, justly says, "In no

region of the world is travelling more full of incident, more prolific in perilous adventure, than in the dense tropical forests and along the mighty streams of the still practically virgin areas which form so large a part of the South American continent." G. E. C.

Amazon Tributaries.

'Voyage au Rio Curua;' 'Voyage à la Mapuerá;' 'Voyage au Mayecurú.' Par Madame O. Coudreau. 3 vols. Paris: A. Lahure. 1903.

In the vicinity of Obidos, on the Amazon river, are three small streams entering the great fluvial artery from the north. Between 1900 and 1903, the venturesome widow of M. Henri Coudreau examined these, and the works above named are the records of her voyages and excursions. They give an entertaining account of her impressions, her local everyday experiences, comments on the Brazilians and the indians whom she met or had in her employ, and an occasional valuable remark upon the geography of the districts through which she travelled. With happy poetry and sentiment, she impresses her pages with the atmosphere of her surroundings, translates the reader to the dreamy groves of the margin of the Amazon, and lazily swings him in the *hamac* of her volubility.

Her works are profusely illustrated with vignettes, which are especially valuable as showing the character of the numberless cataracts and falls which obstruct the rivers she ascended. Each volume is accompanied by maps on a large scale, showing the courses of the streams and the very numerous impediments to their navigation. Altogether Madame Coudreau's chapters are pleasant reading, and one can but admire the ready wit, courage, and tact which enabled her to overcome any obstacle she encountered. G. E. C.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Glaciers.

'Die Gletscher.' By Dr. Hans Hess. Pp. xi., 426. Braunschweig: F. Vieweg und Sohn. 1904.

This handbook may be said to meet a long-felt want. It is now nearly twenty years since Prof. Heim published his 'Gletscherkunde,' and during the interval the advance of our knowledge of glaciers and all that relates to glaciation has been rapid. In Greenland, Alaska, Spitzbergen, and the Antarctic Regions, scientific travellers have investigated the operations of existing glaciers and ice-sheets, while geologists have brought to light many important facts regarding the history and subdivisions of the glacial period, and the existence of glacial deposits in the earlier formations. The time was evidently ripe for an up-to-date work which should summarize the results of the different lines of research, and Prof. Hess combines in himself many of the essential qualifications necessary for success in the task. He has produced a book which is clear and concise, and in which the different parts of the subject are treated of in sufficient detail for the purposes of the general reader, while he has not failed to consider the results of the latest investigations. The polemical aspects of the subject are not passed over, but are not allowed to dwarf the less-debated because well-established conclusions. As a scientific handbook this treatise deserves to be welcomed, if only because the writer has not hesitated to take up a strong position against many eminent authorities, where he thought the balance of evidence and the results of his own investigations were distinctly opposed to their views.

On the question of glacial erosion, with the attendant phenomena of over-deepening of valleys and formation of lake-basins, he is evidently a follower of Penck, Brückner, and Baltzer, and departs widely from the position of Heim. He

considers ice a more powerful agent of erosion than running water, and is prepared even to assume that some glaciers may lower their beds at a rate of 2 or 3 centimetres a year under favourable circumstances. Whether this is not an extreme view time alone can tell, but it is, at any rate, refreshing to see these conclusions so confidently advanced in spite of the strong criticism which they have always provoked. The author also supports the opinion, which is now practically universally accepted by geologists, that the Ice Age included three or perhaps four distinct epochs of intense cold separated by intervals of warmer climate. Two more important problems, the cause of climatic changes and the mechanism of the flow of glaciers, he discusses more or less freely, but admits are not completely solved.

Useful tables of statistics are given regarding the advance and retreat of the Alpine glaciers during recent years. Though we miss the picturesqueness and individuality which makes Heim's book so attractive, this may be welcomed as the best and most complete recent work on the subject of which it treats.

J. S. F.

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

The Earth and Man.

'Geographische Kulturkunde.' By Leo Frobenius. With eighteen Plates and forty-three Sketch-maps in the Text. Leipzig: Frederich Brandstetter. 1904. Pp. xvi. and 924.

In an explanatory sub-title, Herr Frobenius tells us that this work is an exposition of the relations existing between the Earth and human culture as described by early and late observers, the practical object being to enliven geographical instruction in the schoolroom. For this purpose the plan adopted should prove successful, and in any case the book will be welcomed by those serious students who, not being specialists, still take an intelligent interest in the numerous questions concerned with the relations of man, and especially of the lower races, to their environment. There are the grassy plains and the nomads, exclaims the author, the fertile slopes and the husbandmen, the woodlands and the hunters, the fluvial waters and the canoe-men, the open seas and the seafarers; that is to say, men are what their surroundings have made them. And it is pointed out that their dependence on the physical conditions of their existence is in direct ratio to their social state. In other words, the ruder, the more primitive their institutions, the more influenced and controlled they are by the character of the regions in which they have grown up and slowly reached higher levels of civilization. Hence this civilization in all its phases is properly called "geographische Kulturkunde," which may, without too great straining, be literally rendered "geographical culture-lore."

It is a fine theme, certainly not new, yet of biding interest, and here systematically treated almost for the first time in a pleasant, attractive way. The author humorously compares himself to the orchestral "conductor," who summons the good and bad musicians, invites them to play their several parts, and controls the whole performance. Whoso wishes, he says, to hear the tuneful notes of the natural fiddle and the clash of all the instruments, must turn to the first section, which introduces the several chapters. These introductory sections are, so to say, the "printed programmes" handed round to the audience, who thus know what they have to expect, and will follow the performance with greater intelligence and enjoyment to the end.

The contents of chapter i. will make all this clear, and give the reader a fair idea of the general treatment. We have, first of all, the "programme," "Africa and the Africans," which is written by the "conductor," and gives a rapid *aperçu* of

the physical and mental characters of the inhabitants of the continent, showing how everything harmonizes with its physiography, and illustrating the whole subject with several little inset maps and a full-page plate, exhibiting the more typical agricultural and other implements of the aborigines. Then follow the "selections" of the varied "programme," which of course constitute the great bulk of the volume. The first chapter leads off with the Negritos of the forest zone, the chief "musician" here being Sir H. M. Stanley. He is succeeded by Herbert Ward, Georg Schweinfurth, L. Wolf, Oscar Lenz, Max Buchner, and J. L. Wilson, to whom are severally assigned, "The Congo Peoples and their Pursuits;" "A First Visit to the Mangbattu King, Munza;" "A First Visit to the Bakuba Chief, Lukengo;" "Fetishism on the West Coast;" "The Duallas of the Kamerun;" and "The Tribal Organization of the Kru Negroes." The excellence of the performance is at once guaranteed by the names of these "skilful musicians," while the copious extracts from their "compositions" are supplemented, wherever necessary, by the author's explanatory remarks.

But the "execution" is, of course, not everywhere equally brilliant, and the critical ear seems here and there to detect a jarring note emitted by the "maestro" himself. Thus, in the preface we read of a nomad state which had acquired a wonderful development in South Africa amongst the "Reitervölker," who "von Asien aus weit über Afrika hin herrschen," but who certainly never came within thousands of miles of South Africa. This nomad state is elsewhere (p. 155) regarded as a degraded phase of a higher culture, "most nomads having formerly been agriculturists driven to the desert." I think it may be shown that the reverse is the case, and that the Semites, for instance, were *originally* nomads, who often overran the settled districts (Mauritania, Iberia), and reduced some of these districts (Mesopotamia) to a wilderness. In the same place the Tedas are called "Negroes." But, as shown by Nachtigal ('Sahara und Sudan,' vol. ii.), the Tedas are the northern and original section of the Tibus, who are not Negroes, but Hamites, akin to the neighbouring Berbers.

But such slips are not numerous, and the chief fault to be found with the book is its unwieldy size (940 pages), with no proper sectional divisions, no index, and a very poor table of contents. But no doubt the cost of production was in this instance a matter of serious consideration.

A. H. K.

GENERAL.

The Record of a Soldier.

'From Kabul to Kumassi.' By Brigadier-General Sir James Willcocks. John Murray. 1904. Pp. xvi., 440.

This is Sir James Willcocks' record—Afghan campaign, 1879; Waziri expedition, 1881; Soudan campaign, 1885; Burmah, 1885; Chin-Lushai expedition, 1889; Munipore expeditionary force, 1891; Tochi field force; West Africa. His book is the ideal of a soldier's autobiography. The story arrests attention from the moment when, with the brazen audacity of youth, he telegraphed to ask for a place in the forces for Afghanistan. He got it, just as he got the Distinguished Service Order and other rewards of bravery, though we are not told very much about them. But it is evident that his heart lies in his work in Africa. This has an additional interest, inasmuch as he left India to serve under, and at the special request of, Sir Frederick Lugard, of whose brilliant personality and services to the Empire we are told a great deal. Modesty is, therefore, one attribute of Sir James Willcocks' writing; another is simplicity. Political questions, apart from actual facts as he witnessed them, are happily ignored. His business is to tell only how

a soldier has done and enjoyed his work, and his pleasure too, for he is a strenuous sportsman. There is something very attractive about this sequence of events in Borgu in 1898. Upon a day our troops are very nearly at grips with the French. At the last moment, when tension is just at the breaking-point, comes news of the Niger Convention. The French withdraw from Borgu, and Sir James goes off to shoot his first African antelope. As an author he is fortunate in his own story, for the climax comes dramatically at the end, with the relief, of course, of Kumassi. Any story with such a culmination must needs be of interest; in this author's hands it gains greatly from his ability to stage it fitly; throughout he depicts clearly, not his actions only, but the various stages on which he has acted, having the descriptive touch. His book is on all counts welcome.

O. J. R. H.

THE MONTHLY RECORD.

EUROPE.

The Limits of the Cotswolds.—Mr. S. S. Buckman has recently investigated this question, taking into account historical and local usage as well as physical characteristics. The following is his general definition of the Cotswolds or Cotteswold Hills. High ground mostly in Gloucestershire, bounded on the south-west by the vale of Berkeley, on the west by the vale of Gloucester, on the north-west and north by the vale of Evesham, on the north-east by the vale of the Red Horse, on the east by the vale of Moreton and the Evenlode valley, on the south-east by the vale of the White Horse, and on the south by the valley of the Bristol Avon. The western ridge is precipitous, and generally more than 700 feet at the southern end, to about 900 feet at the northern end above sea-level. Here a considerable area is over 1000 feet. Cleeve Hill, 1083 feet, is the highest point; Broadway Hill, 1048 feet, the next. The greatest length is 57 miles, greatest breadth from Standish Brawn to Wilcote is 35 miles. Outliers are Robin's Wood (Matson), Churchdown (Chosen), Dumbleton, Breden, etc. North of Stinchcombe Hill the trend is south-west to north-east, and south of it north to south. The Stroud valley has been usually taken to divide the Cotswolds into a north and a south part. Mr. Buckman, for geological reasons, divides them into three—(1) The South Cotswolds, extending along the valley of the Bath Avon to the vale of Stonehouse (Frome valley), the line following the road from Chalford to Siddington (Cirencester), and extending along the outcrop of Cornbrash; (2) the Middle Cotswolds, running to the Chelt valley, the road from Andoversford to Little Barrington, and the valley of Windrush; and (3) the North Cotswolds beyond this. The vale of Berkeley runs from Thornbury and Wilkmar in the south, and a line from Bredon Hill to Oxenton. South of it the plain has no special name. The vale of the Red Horse is the low-lying ground round the Stour valley, parting the north Cotswolds from Edge Hill range. The vale of Moreton, 400 feet above sea, extends from Moreton-in-the-Marsh to Shipton-under-Wychwood. The vale of Gawcombe may be given an offshoot opposite Chipping Norton. The vale of Bourton, an upland vale in the Cotswolds, is nearly 400 feet above sea, which almost breaks into foam near Stow. The vale of the White Horse he extends, on very doubtful grounds, to that of the upper Thames; but surely the line of heights from Farringdon to Oxford is sufficiently obvious to make it desirable, even if there were more evidence in favour of the extended signification than there is, to distinguish between the two. Mr. Buckman points out that use might be made of the local distinction between a "valley" (narrow) and a "vale" (broad), the latter generally associated with a

place-name. The vale would be the equivalent of strath. The valley sides are called "banks," the floors "bottoms," and the aggraded floor of a dry valley is known as a "flat." "Combe" is applied to the narrow head of a valley. He also discusses the derivation of the word "Cotteswold" or "Cotswold," and decides it is from the Celtic "Coet y sellt" or "Coed y swl," the limit of the wood, or the wood of the plain, corrupted by Teutons into Catwald or Catteswald, hence Cotteswold, which he considers the best form. Mr. Buckman makes fun of Ritter's Geographical Statistical Lexicon for saying the Cotswolds are 6 miles long by 4 wide, but the translator of the piece has been misled, and translated German into English miles. Multiplying by 4·6 statute miles, the English equivalent of the German mile, we get less preposterous-looking figures.

Bathymetric Map of Grasmere.—The late Mr. T. A. Green, of Grasmere, made an extremely detailed survey of the lake of that name, and shortly before his death he printed a small number of copies of the resulting map on the scale of 25 inches to a mile, one of which has now been presented to this Society by his niece, Miss L. Sumner. No less than seventy-one lines of soundings have been run across the lake in different directions, and the soundings themselves are given in feet at intervals of about 20 yards. Along each line of soundings a vertical section is drawn showing the depths to the same scale as the distances. In addition to the figures, depths are shown by tints of blue and contour-lines at 10-feet intervals. The lake is the largest of those (except Thirlmere) which were omitted from the survey by Dr. H. R. Mill and Mr. E. Heawood in 1893–94, and on reference to the description of that survey,* it will be recognized that Grasmere belongs, on the whole, to the broad and shallow type, resembling in this respect Derwentwater and Bassenthwaite Water. The lake is divided from north to south by a ridge bearing an island the area of which is a larger fraction of the area of the lake containing it than in any other case in the Lake District. To the west of this ridge the depression is deepest at the northern end, where, however, the maximum depth is only 41 feet, opposite the centre of the island. To the east the depression is considerably larger, and lies towards the south, the deepest sounding obtained being 75 feet. It is interesting to notice that this is within 3 feet of the maximum depth obtained in Derwentwater and Bassenthwaite, and as the level of the two latter was at a minimum when the soundings were made, it may safely be said that the three lakes are of the same maximum depth. The following table has been reproduced from Dr. Mill's paper (*Geographical Journal*, vol. vi. p. 162), with the statistics of Grasmere added :—

Name.	Length miles.	Breadth, yards.		Mean breadth per cent. of length	Elevation of surface above sea, feet.	Depth.			Area, sq. miles.	Volume, million cubic ft.	Drainage area of land.	
						Feet.		Mean per cent. of max.			Total in sq. miles.	Ratio to area of lake.
		Max.	Mean.			Max.	Mean.					
Windermere ...	10·50	1610	950	5	130	219	78½	36	5·69	12,250	88·65	15·5
Ullswater	7·35	1100	827	6½	476	205	83	40	3·44	7870	55·95	16·3
Wastwater	3·00	880	650	12	200	258	134½	52	1·12	4128	18·64	16·7
Coniston Water ...	5·41	870	600	6½	143	184	79	43	1·89	4000	23·34	12·4
Crummock Water ...	2·50	1000	700	16	321	144	87½	61	0·97	2343	16·80	17·3
Ennerdale Water ...	2·40	1000	800	19	368	148	62	42	1·12	1978	16·95	15·1
Bassenthwaite Water	3·83	1300	950	14	223	70	18	26	2·06	1023	91·51†	44·2
Derwentwater ...	2·87	2130	1270	25	244	72	18	25	2·06	1010	31·83	15·4
Haweswater	2·33	600	405	10	694	103	39½	38	0·54	589	11·20	20·7
Buttermere	1·26	670	620	2½	329	94	54½	58	0·36	537	6·50	18·0
Grasmere	0·96	766	488	29	204	75	32	42	0·25	184	11·40	45·6

* *Geographical Journal*, vol. vi. (1895), pp. 46, 135.

† Excluding Derwentwater and Thirlmere drainage areas; including these = 131·2 square miles.

Geology of the Teign Valley.—In a paper read at Sidmouth by Mr. Harford J. Lowe, entitled "The Teign Valley and its Geological Problems," the author divides the valley into four natural parts—the upper, upper-middle, lower-middle, and lower. The first is a gathering-ground of the head-streams, the second a gorge-course, the third the valley track proper, and the fourth the estuarine portion. The upper portion presents all the appearance of a lake-bed, but affords no actual evidence that it is one, and Mr. Lowe suggests that the unusual weathering of the granite here, into the form of a broad depression, is due to traversing dykes of elvan and veins of schorl, the intrusion of which appears to be accompanied by a disintegrated condition of the granite. Mr. Lowe provides an estimate for the carrying out of the gorge track at nearly four million years. In contrast to the upper course, the lower presents the undoubted phenomenon of a lake-basin, for the existence of which it is no less difficult to account. This is the Bovey basin, filled up for the most part with the contents of the upper depression, and estimated at 400 feet in depth. The only possible explanation of its existence seems to lie in the supposition of a small downward counter folding, occurring in the same period as the upward bending of the new Eocene land of the east of Dartmoor. It is of interest to compare the paper with that of Mr. A. J. Jukes-Brown, referred to in the May number of the *Journal* (p. 679).

Vegetation Lines in the Alps.—An instructive study of the vegetation lines in the Tyrolese Alps has lately been carried out by H. Reishauer of Leipzig, who presents the results of his work in the sixth volume of the *Wissenschaftliche Veröffentlichungen* of the Leipzig Geographical Society (1904). In the introduction to the monograph, the author discusses the general principles concerned in the study of vegetation lines, and explains the scope and methods of his own investigations, which were intended to fill a gap left by former students of Tyrolese plant geography, who had paid little attention to the southern part of the region. He therefore chose the Adamello group as a field for research in the south, and in order to make possible a comparison of the conditions with those prevailing in the centre of the Tyrol, carried out a similar examination of the Stubaier Alps, lying in almost the same meridian as the Adamello group, but about a degree further north. The detailed results for each of the groups are presented first, and in the final section of the paper a careful comparison is made between the two. We can only speak here of some of the facts brought out by this comparison, which is the most instructive part of the study. In order to avoid repetition, we may designate the two groups by the letters A and B, A referring to the Stubaier Alps, B to the Adamello group. Taking first the lines of permanent settlement and growth of corn, the author finds that both are far higher in A than B, the differences amounting to 1624 and 1561 feet respectively. This is not to be accounted for by climatic influences, for, although B falls within the Mediterranean floral region, this only accounts for the presence of new kinds of plants in this district. It is rather due to the structure of the mountains (A being composed of slates, B of more sterile tonalite), and to the difference in the inhabitants, the German settler being content with conditions which do not satisfy the Italian. This is emphasized by the fact that if we examine the limit of growth of a tree, such as the cherry, which is less directly influenced by the presence of man, the above great difference in altitude virtually disappears. Similarities between the two regions are naturally to be seen in respect of the influence of various natural factors, such as the general elevation of the country, the aspect of the slopes, nature of the soil, and so on, while in certain directions man's influence is also similar. Coming next to the lines of temporary habitation and pasturage, Herr Reishauer shows that these again are higher in A than B, but the difference is not so marked. Here again its cause is

less climatic than orographical, the lack of humus and soil-moisture, the steepness and slipperiness of the tonalite slopes, the absence of much-branching valleys, being all adverse to a large extent of high-level pastures in the Adamello group. The temperament and pastoral systems of the two races here, too, account for much. Lastly, the author examines the differences and similarities in the case of the lines of forest and tree-growth. While these occur on the whole at closely similar elevations in the two districts, the lines are separated by a wider interval in B than in A. The orographical and geological factors, which in B are adverse to the ascent of continuous forest to any considerable elevation, do not act so powerfully in the case of single trees. That the tree-limit is lower in A than B is in part a result of the destruction wrought by man in the case of the former. Many conditions, however (soil, relief, aspect, etc.), operate in a precisely similar way in the two districts. Thus the regions of greatest general elevation are on the whole those where the tree-lines mount the highest. The influence of aspect is everywhere visible, but though trees mount highest on southerly slopes, those facing north are often more favourable to luxuriance of growth.

Distribution of the Hazel, and Changes of Climate in Sweden.—Dr. Gunnar Andersson has lately undertaken an investigation of the former distribution of the hazel in Sweden, with a view to throwing light on the change of climate which the country appears to have undergone within recent geological times. A careful examination of the peat-moors of the central parts of the kingdom, from 59° to 64° N., has brought to light no fewer than 224 localities in which the fruit or other parts of the tree are to be found in a fossil state, and 219 of these lie outside the limits of its present distribution. Dr. Andersson, who has recorded the results of his observations in the *Afhandlingar* of the Swedish Geological Survey (Ser. Ca. No. 3), shows, by means of maps, both the former distribution as shown by these discoveries of fossils, the existing limit of the growth of the tree as a general ingredient of the vegetation, and the area over which it is now found in isolated localities, evidently remnants of its former more extended habitat, specially favoured in respect of aspect or other local conditions. The remains of other trees associated with those of the hazel show that woods of deciduous trees—birch, alder, aspen, mountain ash, and, further south, lime, elm, maple, and even oak—occupied a much larger area, and that at the time of the greatest extension of the hazel the spruce had not yet established itself in this region. From the distribution in relation to the former shore-line of the Baltic during the *Litorina* period, it is held that conditions were already less favourable to the hazel before the subsequent retreat of the sea took place. Dr. Andersson finds that the August-September isotherm of 9°·5 C. (49°·1 Fahr.) coincides with the former limit of the hazel, and that of 12° C. (53°·6 Fahr.) with its present limit. He therefore concludes that the difference between the two values, viz. 2°·5 C., or 5°·5 Fahr., represents approximately the extent to which the mean temperature of these two months has fallen since the time of the greatest extension of the hazel.

Russian Hydrographic Survey of the Baltic Sea.—In a publication of the Russian Hydrographic Office ('Short Historical Sketch of the Hydrography of the Russian Seas,' part iii.) a detailed account is given of Russian work in the Baltic. The first charts of the Baltic, about the middle of the seventeenth century, were of Swedish origin, and the directory appended to the map of Johan Manson (1644) was, until 1721, used by Russian mariners. In the eighteenth century Russian officers began to execute partial surveys, and by the year 1827 they had made general disconnected investigations of the Baltic and the Gulf of Finland. Meanwhile the invention and improvement of surveying instruments had rendered it possible to institute a hydrographical survey on a more thorough system, and

accordingly in 1838 it was decided to commence a new survey of the Baltic. Lieut.-General Schubert, director of the Hydrographical Department, was appointed superintendent of the survey, which was to include an astronomical and trigonometrical survey, an examination of the coasts, and soundings. The triangulation was entrusted to Baron W. V. Wrangel, and the coast survey and soundings to Captain M. F. Reineke. The charts were to be drawn on the scale of 1:42,000, or nearly $1\frac{3}{4}$ inch to the nautical mile, and 1:16,800, or about $4\frac{1}{3}$ inches to the nautical mile for the harbours, bays, and narrow passages. By 1842 a network of triangles had been extended along all the shores and islands of the Baltic and Gulf of Finland, with the exception of the Gulf of Bothnia, and in 1839 the distances of all the triangulation points from the observatory of Reval had been determined. Since then the work has been steadily continued, and the work accomplished in each year up to 1900 inclusive is described in the publication referred to above. Another publication of the same department contains a list, with descriptions, of the marks set up on the coasts of the Ussuri province and Sakhalin to indicate shoals, reefs, and other dangers to navigation.

AFRICA.

The Lake Moeris Reservoir Project revived.—It will be remembered that some sixteen years ago the proposal to restore the ancient Lake Moeris as a storage reservoir for Nile water attracted considerable attention, Mr. Cope Whitehouse being the originator and most enthusiastic advocate of the project. Sir William Wilcocks has lately come forward as a supporter of a similar project, which, he holds, though presenting insurmountable difficulties in 1888, can be made quite feasible if worked in conjunction with the now completed Assuan reservoir. We have received from the author the printed version of a lecture delivered by Sir William at a meeting of the Khedivial Geographical Society in January last, in which the proposed working of the scheme and its relation to the general irrigation system of Egypt are clearly set forth. Now that, with improved drainage, perennial irrigation is everywhere possible given a sufficiency of water, it has become a pressing question to provide the additional 4 milliards of cubic metres required to give such irrigation to the two million acres hitherto without it, thereby adding some £60,000,000 to the wealth of the country. The Assuan reservoir has provided one milliard, but this has already been allotted, and the Government is reluctantly compelled to refuse all further applications for water. By raising the Assuan dam 6 metres in accordance with Sir William's original plan, a second milliard could be obtained, while the remaining amount could, we are told, be easily stored in the proposed modern Lake Moeris. After sketching the history of the old Lake Moeris, which occupied the Fayum, Sir William shows how the Wadi Rayan, separated from the latter (on its south) by a limestone ridge, could be converted into a reservoir, which would not only afford all the supply needed, but would give effective protection from the dangers attending an excessive flood, by which the whole country is so often kept in a state of high tension. The original objection to the project lay in the fact that Lake Moeris, being only slightly above low Nile level, could only give a plentiful supply in the quite early summer, the discharge rapidly falling with the rise of the Nile. But now that, in the Assuan reservoir, a copious supply is at hand capable of being used just when required, the utilization of the Rayan becomes more feasible. It can be drawn upon to the fullest extent in the early summer, thus allowing the Assuan supply to be reserved intact for the later period. According to the plan adopted, the proposed reservoir would give a supply of two or three milliards of cubic metres respectively, the maximum level in the former case being 27, in the latter 29

metres above sea-level. At the higher level the area covered would be 700 square kilometres, or 270 square miles. The larger project provides a feeder canal 18¾ miles long, starting from the Nile north of Sharauna, and capable of filling the lake to a height of 31 metres above sea-level in case of necessity involved by very high floods. There would be an outlet canal of 12½ miles, which could be used, if thought well, for the filling of the lake, a process which is estimated to take 3½ or four years according to the system adopted, the cost of the two schemes being respectively £2,600,000 and £2,000,000.

The Egyptian Sudan in 1903.—In his latest report on the administration of the Sudan, Lord Cromer states that the future of the Sudan appears to depend mainly on (1) good administration; (2) an increase in the population; (3) improvement of communications; (4) water-supply and cotton cultivation; (5) cheap fuel. Under the first heading he expresses the opinion that the work of civilizing the Sudan is being carried on with zeal, energy, and intelligence, and quotes Sir R. von Slatin to the effect that the situation has improved in every respect. As regards population, inquiries made by Sir Reginald Wingate have led to the surprising result, which is said, however, to be supported by weighty evidence, that out of an estimated population, before the Dervish revolt, of some 8½ millions, more than 6½ millions were carried off by disease or warfare, leaving at present a population of only some 1,800,000. As regards irrigation possibilities, whilst urging the need of full inquiry by experts prior to action on a large scale, Lord Cromer says that experiments may be tried, as at present in the Berber district, at irrigating land for cotton cultivation without injury to Egypt. One of the most important needs of the country is the construction of the Suakim-Berber railway, the serious work on which will, it is hoped, be begun in October next, while Lord Cromer anticipates that it will be in working order early in 1906. It is hoped that this railway will enable the Arabian market to be supplied from the Sudan. A narrow seam of coal (or lignite) has been discovered in Dongola, but an expert examination has not yet been possible. Meanwhile Mr. Barron, of the Geological Survey, has been examining the Abyssinian frontier in search of coal-bearing strata. The sudd-cutting operations, which in previous years had failed to open the true bed of the river, were continued in 1903 by Lieut. Drury and Mr. Poole, and it is hoped that free navigation to the waters of the upper Nile will shortly be opened. It must not be thought, however, that this will favourably affect the water-supply to an appreciable extent. Satisfactory results have also been obtained in the Bahr-el-Ghazal system. Good progress has been made with the survey work, under the direction of Colonel Talbot, R.E., maps having been prepared of the Blue Nile basin, etc., and frontier delimitations effected, that on the side of Abyssinia having been carried out by Major Gwynne. The work of pacification and development has made progress in the various provinces, including the Bahr-el-Ghazal, where several Niam-Niam chiefs have made overtures to come under Government protection.

Moisture condensed from Clouds on Table Mountain.—Observations on the relative luxuriance of the vegetation on the upper parts of Table Mountain as compared with that of the lower region, where the summer drought can only be withstood by plants showing a special adaptation, led Dr. Marloth to study the question of the amount of moisture deposited by the south-east clouds by which the summit is so often veiled in the dry season, this being evidently the source of supply to the higher vegetation. In order to obtain some idea of the amount so obtained, he established two gauges on the mountain, one an ordinary rain-gauge, the other a similar gauge, above which a bunch of reeds was fixed. In spite of difficulties which rendered the observations incomplete, he obtained certain results

(published in the *Transactions* of the South African Philosophical Society, part iv., 1903), which gave the surprisingly large figure of 79·84 inches as the amount collected by the gauge with reeds (in spite of the fact that it had overflowed on three occasions), while during the same period—December 21, 1902, to February 15, 1903—only 4·97 inches had been collected in the open gauge. His conclusion is that during the period of observation the gauge with reeds had condensed a quantity equal to 74·87 inches of rain, and that for the whole summer the amount would probably reach 150 inches, exclusive of rain. He holds, therefore, that during cloudy weather the surface of the mountain becomes an immense sponge, affording vegetation the conditions elsewhere supplied in bogs, and that this condensation of moisture must (as has also been thought by other observers) have a considerable influence on the yield of springs in the lower parts of the mountain. In the next number of the *Transactions*, Mr. C. M. Stewart criticizes Dr. Marloth's results, saying that his figures are greatly too high by reason of the large condensing surface offered by the reeds attached to the gauge. By calculating the area of this surface, he finds that the true depth of rainfall represented by the whole amount collected (including the 4·97 of actual rain) is only 11·87 inches, and that the amount collected from the south-east cloud was only 6·90 inches, or 0·12 inch per diem. While, however, he is probably correct in holding that Dr. Marloth's gauge offered specially favourable conditions for condensation, he is surely at fault in his method of comparing the amount of condensed moisture with rainfall, for the important point is, not how much moisture is obtained per unit of condensing surface, but per unit of ground area. No doubt, in the case of actual growing plants, the surfaces are not so freely exposed to the air-current as in Dr. Marloth's gauge, and in many cases the amount condensed would be re-evaporated without ever reaching the ground.* But against this we must set the fact that the growing plants would frequently be of a much greater height than Dr. Marloth's reeds, so that the condensing surfaces would be thereby increased. This shows, however, the great difficulty, if not impossibility, of obtaining trustworthy figures representing the average amount actually condensed, though it is of interest to know that in certain cases at least it may reach the amount obtained by Dr. Marloth.

AMERICA.

Recent Change of Level at New York.—Trustworthy measures of the rate of change in the relative level of land and sea are still rare enough to make every addition to their number welcome. Mr. G. W. Tull has recently published (*Am. Jour. Sci.*, xvii., 1904, p. 333) the result of his examination of the records obtained from self-registering tide-gauges at and near New York, from 1850 to 1903. He finds that the sea-level is subject to considerable temporary change, mainly determined by the direction and force of the winds. Westerly and north-westerly winds depress the sea-level by as much as 3 feet; easterly and north-easterly winds raise it, but their effect is less than that of the westerly winds, on account of their smaller force and lesser duration; variations of barometric pressure seem to have little effect except in so far as they influence the wind. As the effect of pressure and wind, on the sea-level, at any place, is the integral of their effects taken over a wide area, while the observations are only taken at one point, a close correspondence is not to be expected; yet there is a remarkable agreement between the monthly variation in sea-level and the movement of the north-westerly winds. The monthly changes of level show a minimum, sharply defined, in January, and a

* This may also be the case with light rain falling on the surface of vegetation, but it is none the less included in any estimate of the total rainfall.

maximum, not sharply defined, in August; while the westerly winds have a maximum, sharply defined, in January, and a minimum, not sharply defined, in August. The seasonal difference of level due to this cause averages 0·55 foot. There is also a variation, from year to year, in the annual mean sea-level. This variation is irregularly periodic with a period of three to eight years, and a range of about 3 inches; it can be traced all along the Atlantic coast, and is in close agreement with the yearly variations in the height of the barometer and the force and direction of the wind. Apart from these periodic variations, no alteration in the mean sea-level can be detected between the years 1853 and 1875, but from 1875 to 1902 there was a gradual rise of sea-level at the rate of 1·45 foot per century. This rise cannot be attributed to any meteorological cause, and must be due either to a rise in sea-level or a subsidence of the land; in view of the fact that so many European and Asiatic tide-gauges show no progressive change of level, the author concludes that the latter is the true explanation, and not the former.

The Geodetic Operations in Ecuador.—The report lately presented to the Paris Academy of Sciences by M. Poincaré summarizes the work carried out by the French observers in Ecuador during 1903. The programme included the completion of the observations in the northern area, geodetic work on the Riobamba—Cuenca section, astronomic observations at Cuenca, magnetic observations, and, lastly, the inauguration of the levelling. Owing to various hindrances, this could not be carried out in its entirety. The unfavourable meteorological conditions alluded to in the previous report (*Journal*, vol. xxii. p. 215) continued to be experienced in the northern area, and at three stations it was necessary to remain no fewer than eighty days on this account. The destruction of the signals by the natives also continued to some extent, in spite of the earnest efforts of the Ecuadorian authorities to put a stop to it. However, the work here was finished on February 15 last, and by a preliminary calculation, M. Maurain was able to work out the connection between the bases of Riobamba and Tulcan, the result being to give for the length of the northern base 6604·83 metres, as compared with 6604·77 metres obtained by actual measurement. It is, perhaps, not to be expected that a closer agreement will be made out when the final calculations are made, but it is clear already that a high degree of accuracy has been attained. In the southern area latitude observations have been commenced at Cuenca, and M. Maurain was about to determine the difference of longitude between that station and Quito. The network of triangulation originally laid down in this region will be shifted to the west; for, owing to the disturbances in Columbia, it was found necessary to obtain the required 6° of arc by extending the work south to Payta, which lies much to the west of the prolongation of the original line. This will facilitate operations by bringing them within the drier zone of the western chain of mountains. Levelling work has been done on the north-to-south section between Riobamba and Alausi, and the results are said to be excellent. There remains the east-to-west section from Alausi to Guayaquil, where the chief difficulty will occur at the passage of the Guayas river, a little before Guayaquil. Pendulum work has not made much progress; but one interesting result has been obtained, the results already worked out proving the correctness of Bouguer's formula for this region, whereas it has not been applicable in the Alps and Himalayas. Thus M. de Lapparent's views, based on the tectonic differences between the Andes and Himalayas, are fully borne out. It is hoped that the remaining operations will be completed by the end of 1904.

Roads across the Andes in Peru.—A pamphlet compiled by order of the Minister of Foreign Affairs describes eight routes over the Andes. The most northerly runs from Paita to the Pongo de Manseriche on the Marañon. From

Paita a railway runs 56 miles to Piura; thence to Bagua Chica there is a bridle-road 317 miles long; and the section of the road from Bagua Chica to the Pongo, 211 miles, was under construction in the year 1903. A party of North American engineers has made surveys for a railway from Paita, through Olmos, Huarmanca, and Bellavista to the Pongo, and maintains that this is the best route in South America for a line across the Andes. At Olmos this route joins the road, 120 miles long, to the Marañon at Bellavista, which in the other direction extends 60 miles, to Ferreñafe, a town connected with the Port Eten by a railway 48 miles long. From Pacasmayo there is a railway to Tolón, 36 miles, and thence a bridle-road, 500 miles long, through Cajamarca, across the Marañon (on rafts), and through Chachapoyas and Moyobamba to Yurimaguas, on the Huallaga. It is intended to re-construct the most difficult section, just beyond Moyobamba. The railway from Callao to Oroya, 137 miles, is famous as attaining the greatest altitude of any railway in the world, and thence to Cerro de Pasco a railway built by an American syndicate was to be finished last year. Hence Huanuco can be reached along a bridle-path in two days, and the Rio Mairo in six days more when a road now under construction is finished. This river can be navigated by boats of small draught which descend it, the Palcazu, the Pachitea, and the Ucayali, and reach the Amazons in five days. Another affluent of the Pachitea, the Pichis, can be reached by a road 205 miles long, from Oroya to Puerto Bermudes. From this road another branches off at Tarma and passes through Chanchamayo to the lowest falls of the Perené. From the port of Pisco a railway, 46 miles long, runs to Ica, whence it is three days' journey to Ayacucho, and six more to Puerto Bolognesi, on the Apurimac, which unites with the Mantaro to form the Ene, and this again with the Perené to form the Tambo. The last route mentioned does not lead to a tributary of the Marañon, but to the Inambari, a tributary of the Madre de Dios. Starting from Mollendo, the traveller can journey 298 miles by train to Arequipa and Juliaca, and, taking the branch to Sicuani, leave the train at Santa Rosa and ride through Macusani, Ayapata, and Llinquipata to the river San Gaban, which flows into the Inambari and is navigable by small canoes. The Peruvian government has authorized the construction of a line from Tarma to Chanchamayo, and a North American company has obtained the right of examining two routes on the north of Peru, but the necessary capital has not hitherto been forthcoming.

Dr. Hans Steffen's Journey on the Coast of Southern Chile.—A pamphlet issued in Valparaiso, under the title 'Bericht über eine Reise in den Chilenische Fjordgebiet, nördlich von 48° S. Br.', describes the journey made by Dr. Steffen in the summer of 1898–99, with Count von Schulenburg and Messrs. Michell, Hambleton, and Krantmacher. From Puerto Montt at the head of the Gulf of Ancud the route followed the east coast of the island of Chiloe, and then pursued the "inner lead" within the islands of the archipelago to the south. The great Taitao peninsula was completely encircled, and the inlets east of it, Estero Elefantes and its branch Estero San Francisco, explored. Continuing south, the Estero Kelly and Jesuitas were also entered, and finally a complete exploration was made of the various branches of the Estero Baker, including a journey up the Baker river to Lake Cochrane and journeys a short distance up the Bravo and Pascua rivers, which enter branches of the same inlet. The pamphlet consists mainly of physical description and an account of the circumstances of the journey, and is provided with a general map and a detailed map of the country visited south of the Taitao peninsula.

POLAR REGIONS.

Ice and Barometric Pressure in the East Greenland Sea.—It is well known that the position of the limit of pack-ice in the northern seas differs

enormously in different years, some being especially favourable from the point of view of navigation, others just the reverse. To trace the connection which exists between these variations and those of barometric pressure has been the object of an investigation by Herr W. Brennecke, whose conclusions are summarized in the *Annalen der Hydrographie* (1904, Heft ii.). The writer begins by examining the data regarding the state of the ice from 1877 to 1895, principally on the basis of the work of Captain Ryder published in 1896. Defining as years of unusually much ice those in which it has reached the southern coast of Iceland in the spring or summer, or in which Jan Mayen has been still closely beset in June and July; and as years of unusually little ice those in which hardly any has been seen in the vicinity of Iceland; he finds that 1881, 1882, 1888, and 1891 belong to the former category, and 1884 and 1889 to the latter. He next points out that, apart from local changes due entirely to wind, changes in the position of the ice-line are due to the greater or less extent and intensity of the surface polar current, and this above all to the prevailing winds, so that it is to the causes of variation in the direction of the latter that we must look for an explanation of the variations in the ice-conditions. He therefore examined in detail the distribution of barometric pressure over the northern Atlantic, and found that this showed great variations from one year to another, abnormal conditions often prevailing for months together. The barometric conditions from March to May were also found to exercise a preponderating influence on those of the ice. Taking as a basis the variation in pressure on 70° N. between 20° E. and 20° W. of Greenwich, he found that in years of much ice the difference was much greater than the normal, while in years of little ice it sometimes fell to zero. Thus in 1884 and 1889 the barometric minimum usually found along the west coast of Scandinavia disappeared entirely, while in 1881, 1882, and 1891 the depression was greatly accentuated. The general conclusion is reached that the strengthening of the northerly wind currents, which result in an advance of the ice southward, is due to a lowering of pressure over northern Scandinavia and an increase of pressure over Greenland, the conditions south of 65° N. being without influence. The extent of the gradient between March and May is of primary importance, though its value during the winter months has an influence, though only a secondary one. The writer also examines the temperature conditions, both of the sea and atmosphere, in their relation to those of the ice, and finds, as was to be expected, that the temperature of the surface water of the East Greenland sea and of the air over Iceland and northern Europe is abnormally low in years of much ice, and the reverse when the ice is at a minimum.

The British Antarctic Expedition.—The *Discovery* sailed from Lyttelton on her homeward voyage on June 8, but is not expected home before September. During the stay of the expedition in New Zealand, the following telegram was sent to Captain Scott by the King's orders: "I have read with interest your report, which Sir Clements Markham sent me. I congratulate you and your gallant crew on your splendid achievements, and wish the *Discovery* a safe journey home. I hope to see you on your return to England." The Royal Scottish Geographical Society has expressed its sense of the good work done by the expedition by awarding to Captain Scott the Livingstone Gold Medal for the year.

The Scottish Antarctic Expedition.—The *Dundee Advertiser* for May 31 contained a letter from Captain Robertson, describing the second voyage southward of the *Scotia*, begun at Port Stanley on February 9 of the present year. The voyage has led to important results, having brought the explorers, if their conclusions are correct, to the edge of the Antarctic continent, in a latitude far to the north of that in which it has hitherto been hypothetically drawn in this

quarter. After a week spent at the South Orkneys, where Messrs. Mossman and William Smith were left to continue the scientific observations for another year, the *Scotia* sailed south-east (February 22), reaching the pack in 66° S. A southward course was continued till March 3, when, in lat. 72° 25′ S., long. 18° W., the ice-foot of the supposed continent was reached. Had Sir James Ross advanced 50 miles further south in 1843, he must have made the discovery. The glacier was followed south until March 7, when, in 74° S., 24° W., a severe blizzard was encountered, and the ship was beset and lifted 4 feet by ice-pressure. The continent spread out as a vast wilderness of barren ice, but the sea teemed with life—seals, emperor penguins, antarctic and snowy petrels, etc. It was feared that the ship might remain fast for the winter, but on March 14 the ice began to crack, and the ship at last became free, and by March 22 got clear of the pack. Crossing the part of the ocean known as Ross's deep, a sounding of 2650 fathoms was obtained where Ross found no bottom with 4000 fathoms. This figure, as to the accuracy of which some doubts have hitherto been felt, must therefore, it seems, have been an error. Continuing to steer north, the *Scotia* reached Gough island, sounding and trawling all the way. At Gough island a party landed with great difficulty, owing to the swell rolling in on a rocky shore, and spent a day making collections. The island is fertile, and has an inviting appearance, though there are no inhabitants. After a fine passage, during which soundings of 1807, 2600, and 2900 fathoms were obtained in turn, the cape was reached on May 5. Mr. Bruce's work is particularly valuable from the point of view of oceanography, and his soundings give quite a new idea as to the contours of this part of the ocean floor. He is expected to reach this country during July. We are pleased to state that a gold medal has been awarded to the explorer by the Scottish Geographical Society.

GENERAL.

The Anglo-French Agreement.—The agreement between France and Great Britain signed on April 8 last has not brought about any extensive changes of frontier, being rather concerned with the definition of political rights in regions in which one or other power exercises an influence, as in Egypt and Morocco. The principal cessions of territory are in Africa, where France obtains (1) a small area on the Gambia, including Yarbutenda, near the head of navigation, the frontier being so arranged as to give France access, in any case, to the navigable waters; (2) the small group of the Los islands lying off Konakri, the capital of French Guinea; (3) two strips of territory to the north of British Nigeria, whereby a practical route from Say to Lake Chad will be assured within French territory. The arbitrary and unnatural irregularities in the course of the frontier are thus smoothed off, the eastern and western sections forming more or less natural continuations of the line to the south of Zinder adopted in 1898. The last section of the line in the direction of Lake Chad follows the course of the Waube-Komadugu. As regards Siam, while the main provisions of the treaty of 1896 (*Journal*, vol. xii. p. 297) are re-affirmed, a supplementary declaration is added whereby the portions of the kingdom lying to the east and west of the basin of the Menam are definitely stated to be under French and British influence respectively. It will be remembered that, by the treaty of 1896, the territory guaranteed to Siam included, in addition to the basin of the Menam, certain areas on the gulf of Siam on the east and west of that basin, as well as a small area to the north of the Menam basin adjoining the kingdom of Luang Prabang. The first two areas fall now, however, to the French and English spheres of influence respectively, while that to the north, not specified in the new declaration, must be held to remain as assigned in 1896; although the rectification of the frontier of Luang Prabang, carried out

by the Franco-Siamese treaty of February last, would seem somewhat to encroach on the central Siamese zone as defined in that year. In Newfoundland France at last abandons her special rights on the so-called French shore in the north and west of the island established by the Treaty of Utrecht. Lastly, in Madagascar Great Britain withdraws her protest against the tariff introduced by France, and in the New Hebrides a commission is to be appointed to settle the differences between French and British settlers.

The International Geographical Congress in the United States.—We have received a draft programme in detail of the proposed proceedings of the Eighth International Geographical Congress. The formal opening will take place in the Colombian University Hall, Washington, on the morning of September 8, an informal reception by Dr. McGee, president of the National Geographic Society, being held the evening before. During the three days' proceedings at Washington general meetings will be held in the morning; sectional meetings, receptions, and social gatherings in the afternoon. On Monday, September 12, the Congress will be entertained by the Philadelphia Geographical Society, and on Tuesday and Wednesday by the American Geographical Society in New York. On Thursday, September 15, there will be a trip up the Hudson, and on September 16 a field meeting at Niagara Falls. Chicago will be visited on September 17, and on Monday, Tuesday, and Wednesday, September 19 to 21, the Congress will join in the meetings of the Congress of Arts and Science at St. Louis. A trip to the Far West is planned after adjournment, and on return to Washington the Congress will be received by President Roosevelt. It is hoped that a definite programme, with announcement of the papers to be read at the meetings, will shortly be issued.

British Geographical Exhibits at the St. Louis Exhibition.—The Royal Commission entrusted with the organization of the British exhibits at the St. Louis Exhibition has issued a catalogue of objects shown in Group 18 of the department of liberal arts, which embraces the subjects of Geography and Exploration. The first of the bodies exhibiting under this section is the Ordnance Survey Department, which has sent specimens of maps issued by the Survey on various scales from the 10-mile-to-the-inch map of Great Britain to the 5-feet-to-the-mile plan of London. The Topographical section of the Intelligence Division of the War Office exhibits specimens of the 1:1,000,000 general map of Africa now in course of issue, and of the larger-scale maps of special regions (also chiefly African) prepared in connection with recent events of importance. Our own Society is well represented by a selection from its publications and other objects of interest, including (1) a complete set of the *Journal* to the end of 1903, and of the extra series, together with the 'Antarctic Manual,' 'Hints to Travellers,' etc.; (2) a mounted set of the more important maps and illustrations contained in the *Journal*, etc.; (3) portraits of Presidents of the Society; (4) miscellaneous photographs, including those of Livingstone's tree and memorial, Stuart's tree, the *Discovery*, etc., etc.; (5) photographs of explorers' original manuscript maps; (6) photographs of the Society's gold medallists and case containing medals; (7) a selection of instruments recommended for use by explorers and geographical surveyors. Other organizations represented are the Cretan, Egypt, and Palestine Exploration Funds, the Hydrographical Department of the Admiralty (which exhibits specimens of original and published charts, and special types of instruments used in hydrographic work), and the Royal Observatory; while specimens of their publications are sent by such firms as Stanford, Bartholomew, Keith Johnston, and others.

OBITUARY.

Henry Morton Stanley.

By E. G. Ravenstein.

The death of Sir Henry Morton Stanley, in the early morning of May 9, removes one more of the few survivors of that valiant band of pioneer explorers whose labours during the second half of the nineteenth century revealed to us the geographical features of tropical Central Africa. Sir Henry's health had been indifferent for some time past, but the immediate cause of his death was a chill, which developed into pneumonia and pleurisy. Lovingly nursed by a devoted wife during the whole of his illness, he remained conscious to the last.

Stanley, or, to call him by his original name, James Rowlands, was born in Denbigh, of humble parents, on June 10, 1840. He was educated at an elementary school at St. Asaph, and might have remained there to the end of his days as assistant teacher had not a laudable ambition and the consciousness of his capacities impelled him to seek a more promising field of activity. When about seventeen years of age he walked to Liverpool, and managed to obtain a passage in a vessel proceeding to New Orleans. There he was fortunate enough to find in Mr. Henry Morton Stanley, not only an employer but also a friend, who treated his young clerk as an adopted son, and would no doubt have provided for him had he not died prematurely. Young Rowlands at that time adopted the name of his benefactor, and made it famous. He was engaged in the American Civil War, enlisted in the American navy, and is understood to have served for a time on board the *Ticonderoga*.

On the conclusion of the war, Stanley entered upon that journalistic career which gave scope for the display of his abilities, and enabled him to follow the path which led up to fame and fortune. In 1867 he left New York as a special correspondent of the *New York Herald*, charged with the duty of recording the operations of the English punitive expedition in Abyssinia; and so well did he perform this duty, that the news of the fall of Magdala was received earlier in New York than it was in London.

The Finding of Livingstone.

When he returned from Abyssinia, Stanley was sent by the proprietor of his journal to Spain, but on October 16, 1869, Mr. James Gordon Bennett summoned him by telegraph to Paris. Stanley started at once, arrived in Paris in the middle of the night, found Mr. Bennett in bed, and was abruptly commissioned to "Find Livingstone," who had left the coast for his last journey in March, 1866, and had not been heard of for a number of years. It seems rather curious, under such circumstances, that Stanley, instead of proceeding direct to Zanzibar, should not only have attended the opening of the Suez canal, in November, but should also have travelled to India, by way of Constantinople, the Caucasus, and Persia. His arrival at Zanzibar was thus delayed until January 6, 1871, and already on February 18 the first detachment of his caravan left Bagamoyo for the interior. The direct road from Unyanyembe to Lake Tanganyika being closed in consequence of hostilities between the Arabs and Mirambo, a powerful native chief, Stanley travelled by a southern route, and safely reached Ujiji on November 10, where he had the good fortune to meet Livingstone, who, only nineteen days before, had returned to that place from the west. The relations between the veteran explorer and his young and ardent "deliverer" were extremely cordial from the first. Jointly they

travelled to the northern extremity of the lake, and then proceeded eastward to Unyanyembe, where Livingstone waited until the supplies forwarded by the Royal Geographical Society's Relief Expedition,* under Lieut. Llewellyn Dawson, had reached him, when he once more plunged into Central Africa, only to die there. Lieut. V. L. Cameron, in August, 1873, met Livingstone's servants in Unyanyembe, carrying the body of their beloved master to the coast. Long before this, on May 6, 1872, Stanley had reached Bagamoyo on the East Coast; in August he was once more in England. He made his first appearance in public before an enthusiastic meeting of the Geographical Section of the British Association at Brighton, and on October 21, at a dinner given in his honour, he was presented with the Patron's Medal of the Royal Geographical Society "for his relief of Dr. Livingstone, and for bringing his valuable journals and papers to England." The Council decided to award this medal six months before the time, an honour which has never been accorded to any other explorer.

"*Through the Dark Continent.*"

The "finding" of Livingstone had won Stanley popularity; his next expedition was to gain for him a foremost position among African pioneer explorers, not only of the nineteenth century, but of all times. It was on his return from Ashanti, in 1874, whither he had gone as the correspondent of the *New York Herald* to report on General Wolseley's military operations, that he heard of the death of his friend Livingstone. He at once made up his mind to complete the work which death had prevented the great missionary-traveller from accomplishing. The proprietors of the *Daily Telegraph* and the *New York Herald* most readily supplied the funds for the proposed enterprise, and already on November 17, 1874, he was able to start from Bagamoyo with a well-organized caravan. The geographical labours accomplished during this the most memorable journey ever undertaken resulted in a vast increase of our knowledge of the continent. The Victoria Nyanza was circumnavigated, and was given approximately its correct shape upon our maps; another lake, now known as the Albert Edward and distinct from the Albert Nyanza, was discovered to the westward; our knowledge of the basin of the Kagera or Alexandra Nile was much extended; the Tanganyika was circumnavigated, and the Lukuga, its outlet, more closely examined; and lastly, to crown all, the Lualaba was traced from Nyangwe, the furthest point reached by Livingstone and Cameron, to the highest point on the lower Congo reached by Tuckey in 1816. When Tippo Tib, the notorious Arab chief, who had joined his forces to those of Stanley, retraced his steps, the latter, nothing daunted, embarked upon the unknown river, and, despite of physical obstacles and the hostility shown by cannibal tribes, accomplished his object. At length, on August 12, 1877, just one thousand days after he had left the East Coast, Stanley stood at Banana on the open Atlantic. Of the 222 men with whom he had started, there remained with him only 114; the others were dead. Stanley himself had turned grey, although not yet forty-eight years of age.

The results of this memorable expedition were not geographical only. Even whilst Stanley was still hidden in the heart of Africa, in the spring of 1876, the Church Missionary Society sent out a pioneer expedition, with a view to the occupation of Uganda, which had been described as a most promising field for missionary labour, and in July, 1877, the Rev. C. T. Wilson had his first interview with King Mtesa. Two years afterwards witnessed the arrival of Roman Catholic missionaries.

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* For a report on the Livingstone Relief Expedition, see *Proceedings R.G.S.*, xvi., 1872, pp. 412-442.

Henry Lee Stanley

The Congo Free State.

Stanley's account, however, of a vast system of navigable rivers giving access to a considerable part of tropical Africa, and of the resources of the countries through which he had passed, at once roused the attention of the commercial world, and his prediction that the Congo, at an early date, would occupy the political world likewise, was soon to be realized. The King of the Belgians, who had founded an international association for the exploration and civilization of Africa in 1876, was one of the first to grasp the future importance of the Congo basin. When Stanley landed at Marseilles in January, 1878, he was met by agents of King Leopold, and ultimately persuaded to place himself at the head of an expedition to be fitted out by a "Comité d'études du Haut Congo," the objects of which were declared to be philanthropic, scientific, and commercial. Stanley's stay on the Congo extended from August, 1879, to June, 1884. By the time he left, Stanley had cut a road from the lower Congo to Stanley Pool, whence his nickname a "Mbula Matadi," or "rock-breaker," given him by the natives. He had carried up the road four small steamers in sections, and had launched them upon the upper Congo; and he had built forty stations, as high up as Stanley falls. This remarkable success in the face of exceptional difficulties, and the inexperience or unfitness of many of his subordinates, afforded once more proof of Stanley's indomitable energy and fulness of resource. Whilst still out in Africa the "Comité" had developed into an "Association Internationale," and before the Berlin Conference rose from its labours, on January 30, 1885, this "Association" had been reorganized as an independent state under the sovereignty of the King of the Belgians.*

The Emin Relief Expedition.

Stanley's fourth expedition into Africa was undertaken for the relief of Emin Pasha, a man of great scientific attainments whom Gordon had appointed Governor of Equatoria, and who, after the murder of his chief at Khartum in January, 1885, had maintained the Khedivial authority in his province, but, being hard pressed by the Mahdists, had appealed for succour to his friends in England. A government expedition being impracticable at the time, owing to political reasons, Sir William Mackinnon started an "Emin Pasha Relief Fund," which ultimately reached £33,000, including a contribution of £14,000 from the Egyptian Government, and of £3,000 from Sir William himself. Stanley gave up a lucrative lecturing tour in America, and assumed the command of the expedition. For reasons which it is unnecessary to detail here, he elected to take the Congo route to Equatoria. On March 29, 1887, he left the mouth of the river, and on December 12 his advance-guard looked down from Kavalli upon Lake Albert. But it was January 18, 1889, before the whole of his forces were assembled there. Of 646 men with whom he had started there now remained with him only 246! Quite 400 had died of disease, had been killed whilst forcing their way through the forest primeval to the south of the Aruwimi, or were missing. The losses of the rear column had been especially disastrous, and this Stanley ascribed to "the irresolution of the officers and their total disregard of the written instructions;" an accusation strongly resented by the friends of Major Barttelot and Mr. Jameson, the former of whom had been shot in July, 1888, whilst the latter had died at Bangala in August of the same year. As for Emin Pasha, he looked for fresh supplies of ammunition, and not for a rescue. "I will on no account leave my people," he wrote as lately as September,

* For a history of this Conference and the results which sprung from it, see Keltie's 'The Partition of Africa' (London, 1893).

1887, to Dr. Felkin. And even after his people had flouted his authority and made him a prisoner, he hesitated to follow Stanley to the East Coast. When a start was made at last, on May 8, 1889, only about fifty clerks and soldiers were ready to follow their old chief. On December 4 the expedition reached Bagamoyo, and Emin Pasha, after he had recovered from an accidental fall out of a window, severed all intercourse with his English liberators, and, instead of proceeding to Egypt or Europe, entered the German service, and at once returned to Lake Albert. Being rejected by his people who were encamped there, he turned to the westward, and on October 20, 1892, was killed by his guide when a few days' journey from the upper Congo. As far as Emin Pasha was concerned this expedition, therefore, proved a failure, whilst the geographical results, although of considerable importance, were hardly commensurate with the heavy loss of human life and expense incurred. The most important discovery made was that of the snow-clad Ruwenzori, which Stanley unhesitatingly identified with Ptolemy's Mountains of the Moon. Stanley himself, when he returned to England, met with an enthusiastic reception. The Royal Geographical Society, in May, 1890, at a monster meeting at the Albert Hall, presented him with a special gold medal "for his last journey across Africa and the Relief of Emin Pasha." Bronze medals were presented to the officers—Stairs, Dr. Parke, Nelson, Mountenay, Jephson, and Bonny—who had followed him to the East Coast, and silver stars to his native followers. The American residents dedicated to him a testimonial shield of silver, designed by Mr. H. S. Wellcome, whilst universities, city companies, and scientific societies competed with each other to do him honour. The freedom of the City of London had already been presented to him, in a gold casket, in 1887, before he set out on his last expedition. An undeniable proof of Stanley's popularity at the time was expressed by the crowds which gathered within and around Westminster Abbey when, on June 12, 1890, he was married to Miss Dorothy Tennant.

Soon after his marriage, in October, and accompanied by his wife, Stanley started on a lecturing tour through America and Australia. On his return home he was re-naturalized, and in 1899 the Queen conferred upon him a Grand Cross of the Order of the Bath. From 1895 to 1900 he represented North Lambeth in Parliament; but he spoke only on rare occasions, and as years advanced and the hardships which he had undergone during his African wanderings began to tell upon him, he retired almost completely from public life, and having purchased a small estate, Furze Hill, near Pirbright, in Surrey, he spent much of his time in rural retirement. And in the little churchyard of Pirbright, after an impressive service in Westminster Abbey, his remains have found a resting-place.

Henry Sharbau.

It is with great regret that we record the death of the Society's chief draughtsman, Mr. Henry Sharbau, the extent and excellence of whose cartographical work, carried out in that capacity during a period of nearly a quarter of a century, is a matter of knowledge to all, whether at home or abroad, who are acquainted with the Society's publications during that time. Mr. Sharbau, who had passed the age of eighty, had for some time been in failing health, and the death of his wife not many months before his own came as an additional blow from which he never recovered, though he stuck to his work manfully almost to the last.

Mr. Sharbau was born at Lübeck in North Germany in 1822, but came to this country when a young man, his special aptitudes in the direction of surveying and draughtsmanship finding scope, firstly in work on the Ordnance Survey of the

south of Scotland, and afterwards (between 1858 and 1864) in the Admiralty Surveys in the Hebrides and some of the western lochs. In 1861 he assisted in the survey of Loch Lomond under Captain H. C. Otter, R.N., and in 1864 in that of Loch Sunart under Captain E. J. Bedford, R.N., his chief in the Hebrides work having been Commander F. W. L. Thomas, R.N. In 1865 he was appointed temporary assistant in the Hydrographic Office, a post which he held for nine years, or until 1874. In this year he became naturalized as a British subject. Obtaining an appointment under the Japanese Government, he was engaged in survey work in Japan for about two years, and after his return did work as a draughtsman for the Home Office, Admiralty, and in Stanford's establishment until his appointment under the Royal Geographical Society in 1881.

Mr. Sharbau's work was marked by its painstaking and conscientious character; he spared no pains in the working up of the cartographic material brought home by travellers, and its correlation with previous work of the kind. One of the most important results of his labours in this direction was the map of Tibet, compiled by him under the superintendence of General Walker, and first published by the Society in 1894. Those who have only seen his maps as they came from the lithographer's hands have little idea of the excellence of the original drawings, which possessed an artistic finish which was frequently to some extent lost in the final product. Mr. Sharbau belonged to a type of cartographers which is none too common in this country, and his place in the curriculum of the Society's work will not easily be filled.

Obituary of the Year.

The following is a list of the Fellows who have died during the year 1903–1904 (April 30):—

Captain W. S. D. Abbott; Captain L. R. Arthur; Captain G. H. Abadie; Richard James Ashton; George R. Boyle; G. W. Brangwin; W. P. Bransom; J. A. Brown; W. Babington; Hon. G. C. Brodrick; Marmaduke H. Brooking; W. M. Bickerstaff; J. H. Browne; Admiral Henry Boys; Lieut.-Colonel R. Burnaby; Reginald Beech; Lord Colville; J. F. Cobb; Gerald C. Clark; Major-General R. H. Cunliffe; C. E. Campbell; George R. Clark; Lawrence Cussen; Rev. W. J. Craig; Admiral E. J. Church; William Cope Devereux; Sir Edwyn Dawes; John Dugdale; R. J. Donohue; F. Dessen; W. Dawes Freshfield; W. D. Forbes; H. B. Francis; General J. G. R. Forlong; J. S. Forbes; A. J. Gunn; George Gill; J. B. Guthrie; F. St. John Gore; Sir Frank Green; J. J. Gurney; G. E. Y. Gleadowe; Dr. C. H. Gatty; Admiral G. H. Gardner; Colonel H. H. Harvey-Kelly; James Hingston; Benjamin Hocart; T. J. Haughton; C. W. C. Hutton; J. W. Hutchison; Major-General A. H. Hutchinson; S. D. Hopkinson; W. Hounsell; William Hole; Captain Hull; Commander R. P. Jenkins; Dr. J. W. Johnson; J. P. Joaquim; J. Watson-Knight; Louis Levinsohn; General D. Macintyre; P. H. S. Montgomery; E. Masterman; General John Macdonald; Captain A. T. Miller; R. Massie; H. E. Nubar Pasha; Sir Charles Nicholson; George Palmer; Sir James Poole; Archdeacon Pritt; Major C. B. Phipson; General Sir A. Power Palmer; Andrew Pears; T. G. Rooper; A. B. Rathborne; J. K. Rennie; Charles William Roberts; Sir John Robinson; Rev. C. M. Roberts; G. W. Rusden; E. B. Savile; John Stedman; William Sherriff; The Marquis of

SALISBURY; Rev. P. F. SWANN; FREDERICK SCHLUSSER; W. BALIN SMITH; C. J. F. SEVIER; Major A. R. STUART; R. M. W. SWAN; C. A. THURBURN; JOHN TERRY; AUGUSTUS THORNE; H. G. B. THORNTON; W. G. THORPE; Sir J. W. TRUTCH; H. L. TAYLOR; JOHN TAYLOR; Cardinal VAUGHAN; Hon. H. P. VEREKER; Rev. G. T. WARNER; A. A. WESTON; JOHN WATTS; S. J. WESTON; W. L. WATSON; EDWARD WILKINSON; Rev. JOHN WAITE; J. POOLE WAGSTAFFE; CHRISTOPHER WARD.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1903–1904.

Anniversary Meeting, May 16, 1904.—Sir CLEMENTS MARKHAM, K.C.B., F.R.S., President, in the Chair.

The Secretary read the minutes of the last Anniversary Meeting, which were confirmed and signed by the Chairman.

The Secretary read a list of the newly elected Fellows of the Society.

ELECTIONS.—*James Henry Balmer; Thomas Barbour; Rev. Ernest Clapham Bayliss; Captain Edward Berry; Captain R. A. Birley, R.A.; Lionel O. Bowles; Paul August G. Brönnte; Austin Hobart Clark; Frank Gerard Clemow, M.D.; Alexander George Cox; Captain Reginald Cox, 19th Hussars; Ralph Adams Cram; William Parker Devine; W. J. Gillespie Dickson; Alexander Ferguson; William Forbes Fisher; Harry English Fulford, C.M.G.; Frank Nicholson Gibbs; Rev. John Gleeson; A. C. Grylls, M.A.; Alfred James Hamilton; Rev. Isaac Hartill; Louis Condit Hay; Charles Davis Jameson; Francis James Kelly; William Orr Leitch; Cyril Longhurst; Captain Mackintosh, R.A.; C. V. Le Fanu, M.B.; Gilbert St. John McDonald; Marsden Manson; E. Medd; James Bernard Mowat; Charles Walker Neligan; Lieut. Edward Osborne Armstrong Newcombe, R.E.; Richard Clements Nicolaus; Gerald Arthur Sheppard, B.A., LL.B.; Lieut. H. L. Norton Smith (4th Highland Light Infantry); Captain Alec Gavin Stevenson, R.E., D.S.O.; Rowland Storey; R. A. Walker; Archibald Williams; Ernest Colville Wilton; Captain F. C. Heneker (Leinster Regiment); Captain Harold Arthur Clement Mackin; Allister Mitchell Miller; M. C. Petters.*

HONORARY CORRESPONDING MEMBER.

Dr. Otto Nordenskiöld (leader of the Swedish Antarctic Expedition).

The presentation of awards then took place.

The PRESIDENT: Sir Harry Johnston, the Council has decided to award you the Founder's Medal, the highest honour the Society has in its power to bestow, and His Majesty the King has approved of the award. Your services on behalf of geography are cumulative, and they have all been important, first on the western side of Africa, then at Nyasa Land, and then Uganda. You have always done yeoman service to the cause of African discovery. I cannot help alluding to your great administrative talent in the government of those colonies which have had the very good fortune to be under your guidance, for amidst that work you have never failed to advance the cause of geography. It is a very great pleasure to me that it should devolve upon me to give this award, the Founder's Medal, to such a very old friend, and to one whose great ability, energy, and talent has always had my warmest admiration. I now place in your hands the Founder's Medal.

Sir HARRY JOHNSTON: I think that very few words are needed from me to convince you that I am fully sensible of the honour, the very great honour, almost

the greatest honour in the geographical world, that has now been conferred upon me, and also of the peculiar gratification at receiving this honour from the hands of Sir Clements Markham, who is, as he has been kind enough to remind me, one of my oldest friends. From the very first, when, scarcely more than a boy, I was anxious to go out and explore the world, I received great kindness, encouragement and assistance from Sir Clements Markham. In those days, now remote to me, he was the secretary of the Society of which he is now the President, but in those days, in the early eighties, he was always ready to help me in every way that he could, and assist me to explore Africa with as little cost as possible to my own resources. I do not think I shall ever forget the encouragement I received from him—an encouragement which perhaps did much to turn me in that direction. The pleasure that I am experiencing this afternoon is, of course, clouded by the remembrance of another old friend who has just gone to his rest, and who, at a slightly later date than Sir Clements Markham, also did much to urge me in the path that I have followed for a good many years. I refer, of course, to Stanley, whose death all interested in geography and all interested in Africa must deeply regret. I had the privilege of being Stanley's guest for some eight months on the Congo, at the time when he was commencing the foundations of what is now the Congo Free State. He was more concerned, at the time I knew him, in opening up the geography of those regions, and coming into contact in a thoroughly tactful and friendly way with the native tribes of those regions, and I trust I have never forgotten the lessons he impressed on me of the value of tact in dealing with the Africans. Wherever I went on the Congo—and still more in my later experiences in Uganda—I saw what a great impression Stanley had made on the natives by his strong sense of justice, his readiness to enter into their feelings, to talk with them, to hear their complaints, to endeavour to see that there should be no just ground of complaint. All this made a peculiar impression on me; and if I have met with any measure of success in Africa, I ascribe it, next to the advice and encouragement of my few friends at home, to my many friends on the African continent—my black friends, with many of whom, I am glad to say, I am able to keep up a pleasant correspondence to the present day. I shall not detain you any longer, because there are other proceedings to follow, but I think I have said enough to convince you that I appreciate to the full the honour that has been conferred on me; and I tender to the President and to my fellow-members of Council my really earnest expressions of thanks for the sympathy and kindness I have had from so many of them during all the years that I have devoted to African exploration.

The PRESIDENT: Mr. Macartney, the Patron's Medal has been awarded to Commander Robert F. Scott, the leader of our Antarctic Expedition, solely for his wonderful sledge journey to 82° 17′ S. last year, and when this resolution was taken we had not then received the news of his perhaps still more extraordinary journey into the inland of Victoria Land, which, of course, doubles the strength of his claim for our award. The award has been given with the approval of his Majesty the King. Captain Scott has always been himself the leader, and he has expected a great deal from his officers and from his men, but he has never himself failed to do as much work as his officers and men, to endure the same hardships, and to share them alike with his men. Hence he has won the absolute devotion of all on board the *Discovery*. Listen to a few things that have been said by them. One of the officers says, "It would have been a hard job to have found a better man. His sledging is wonderful; he covers distances that you would have said to be impossible, and without dogs. I bet there will be few who will go in for that sort of job, even if they do come out here." Another says, "There is not a man on board who has travelled as

fast and does as much hard work as Captain Scott, nor is there a man who would not follow him anywhere wherever he chose to go." Another says, "My respect and admiration for Captain Scott as a leader are on a par with my appreciation of him as a friend, and that would take a lot of beating. Knowing him as you do, you will not be surprised to hear that he has made an even finer journey on the inland ice this summer. For his untiring energy and perseverance, there is not a man in the ship who does not admire and respect him." So with all the others. And then listen to what Captain Scott says of his men, "No words can express the splendid spirit in which our people work; no work was too heavy for them. I simply long to tell you of the thousand ways in which they showed it, and of the absolute kindly trust and confidence that existed throughout the ship. I should like you to have seen the way our people went to work this year, their mastery of detail, their cheerful acceptance of short rations, the splendid way in which they dragged; one and all went at it in the same spirit." It is with such a leader and such men that great work is done; and great work has been done. I have only alluded to a tithe of the services that Captain Scott has done for us. I have only alluded to the sledge journeys, because those are what the medal is awarded for, and I look upon Captain Scott as being in the very front rank of Arctic or Antarctic travellers. But he has done very much more for us as the most capable leader of this great expedition, which has met with such signal success mainly due to his high qualities and rare gifts. The Council has felt that such services deserve very special recognition, and has determined to present him with a special gold medal illustrative of the expedition, on his return, and they have also resolved to give replicas in silver to the officers and men. Now it only remains for me to present you with the Patron's Medal, to be kept by Mrs. Scott until the return of Captain Scott to England, when we shall give him a most hearty and warm reception.

The Right Hon. W. G. Ellison Macartney: I am desired by Mrs. Scott to express to you her deep sense of the high honour which you have conferred upon her son, Commander Scott. To be enrolled amongst those who have received the Patron's Medal is indeed one of those signal honours to which any explorer can look as the climax of his life, and I feel certain, if Commander Scott was here to-day, he would ascribe any measure of success that has attended this expedition, in the first place, to the great liberality with which it was fitted out by the Royal Geographical Society, aided by the Royal Society, and supplemented by those magnificent donations which came through private donors like Mr. Longstaff. But he would also, I have no doubt, say that to the confidence which was placed in him by those who followed, to the zeal and devotion and unselfishness with which every member of the expedition strove to do their best to merit that honour which has been conferred upon him by the Royal Geographical Society, is mainly owing the place which it will occupy in the future history of Arctic and Antarctic Expeditions. Sir Clements Markham, I beg again to express Mrs. Scott's sincere thanks for the high honour that has been conferred upon her son.

The President: Mr. Colbeck, the Council has felt that it owes a great debt of gratitude to your brother for the admirable way in which he has conducted the Relief Expeditions. Of course, the first one was very much the most important, because then we knew not what had become of the *Discovery*, or where she was; he had to find her. Moreover, it was an exceptionally bad year for navigation. He did his work splendidly, and we have already expressed our feeling on that subject to him; he did his work splendidly both as a sailor and as an ice-navigator. But I think he also deserves the highest credit for his selection of the officers, who have all done so admirably under him, and more especially for his selection and care of the crew, for they showed the greatest zeal during the time they were in the

south; and, what is almost as important, they conducted themselves most respectably when they were in harbour, so that the *Morning* will certainly be a credit to the Mercantile Marine. Feeling all this, our Council has determined to present your brother, Captain Colbeck, with a piece of plate, which will be symbolical of these valuable services, and which will be presented to him on his return to England, I hope, at the same time as the special gold medal to Captain Scott.

Mr. COLBECK: On behalf of my brother, I thank you very much for the great honour you have done him in his absence by making this award. I am only sorry he is not here to receive it himself, and I shall have great pleasure in informing him of your determination. Had he been here, I am certain he would have taken but a small share of the credit, and given to his crew and officers the greater part, and also to your President for the kind counsel he gave him before he left.

The PRESIDENT: Señor Don Carlos Dominguez, sentimos admiracion por el joven officiale Argentino, Julian Irizar, por razon de su zelo y capacidad cuando recibió ordenes tomar bajo su direccion el buque *Uruguay*, rescatar los miémbros del expedicion Nordenskiöld. Saliendo de Buenos Ayres en Octobre del año pasado, antes del medio de Noviembre ha rescatado Dr. Nordenskiöld y sus compañeros de une isla, la tripulacion naufragada del *Antarctico* de una otra, una importante coleccion geologica de una otra. Era trabajo muy bien hecho, y el Consejo de nuestra Sociedad ha escojido Señor Irizar recibir una de nuestras recompensas llamada el "Gill Memorial." Tengo mucho placer poner la diploma en sus manos por trasmision al Señor Irizar.

The PRESIDENT: Señor Don Alberto Rey de Castro. El Consejo de nuestra Sociedad ha contemplado con aprobacion los descubrimientos geograficos hechos por orden de la Junta de Vias Fluviales del Gobierno Peruano, por los Señores Villalta, Cipriano y otros. Especialmente hemos notado los exploraciones del istmo Fitzgarrald, y en los valles del Tambopata y Ynambari. Con el deseo señalar nuestro aprecio de aquellos trabajos importantes, nuestro Consejo ha tomado la resolucion presentar al Señor Villalta una de las recompensas de nuestra Sociedad llamada el "Cuthbert Peek Grant." Agradesco que seria mi oficio poner la diploma en sus manos, preguntando vm mandarla a Lima por el Señor Villalta.

The PRESIDENT: The Back Grant has been awarded to Dr. Stein, for his valuable geographical work in Central Asia, and especially for his mapping in the Sarikol and Kuen-lun ranges. In Dr. Stein we have rare accomplishments. He is not only a surveyor and a good geographer, but also a good Sanscrit scholar. I have some hopes that he will be called upon to join the Tibetan Mission. I am sorry that no one is here to receive the award, but it will be forwarded to Dr. Stein.

The President then delivered his anniversary address (see p. 1).

The Report of the Council was then read; it will be issued with the next Year-book. The President then announced that the Council as proposed had been duly elected. The list is as follows, the names of new members, or of those changing office, being printed in *italics*:—

President: Sir Clements R. Markham, K.C.B., F.R.S., F.S.A. *Vice-Presidents:* Colonel G. Earl Church; Colonel Sir Thomas Hungerford Holdich, R.E., K.C.I.E., C.B.; *Sir Henry E. G. Bulwer*, G.C.M.G.; Admiral Sir F. Leopold McClintock, K.C.B., D.C.L., F.R.S.; Sir George S. Mackenzie, K.C.M.G., C.B.; Field-Marshal Sir Henry W. Norman, G.C.B., G.C.M.G., C.I.E. *Treasurer:* Edward L. Somers Cocks. *Trustees:* Right Hon. Lord Avebury, D.C.L., F.R.S.; Lord Belhaven and Stenton. *Honorary Secretaries:* Major Leonard Darwin, R.E.; James F. Hughes. *Foreign Secretary:* Sir John Kirk, K.C.B., G.C.M.G., F.R.S. *Councillors:* Admiral Sir Lewis A. Beaumont, K.C.M.G.; Prof. T. G. Bonney, D.SC., LL.D., F.R.S.; Admiral Sir James Bruce, K.C.M.G.; J. Annan Bryce; *Major Chas. F. Close*, R.E., C.M.G.; Prof. J. Norman

Collie, F.R.S.; *Captain Ettrick W. Creak*, R.N., C.B., F.R.S.; Prof. E. J. Garwood, F.G.S.; *F. H. H. Guillemard*, M.A., M.D.; *Admiral Sir R. Vesey Hamilton*, K.C.B.; D. G. Hogarth, M.A.; Colonel D. A. Johnston, C.B., R.E.; Sir Harry H. Johnston, G.C.M.G., K.C.B.; *Admiral Sir Albert Hastings Markham*, K.C.B.; Ll. W. Longstaff; *Colonel Sir Colin Scott-Moncrieff*, R.E., K.C.M.G., C.S.I.; General J. H. M. Shaw Stewart, R.E., F.R.S.E.; H. Yates Thompson, J.P.; *Colonel Sir Henry R. Thuillier*, R.E., K.C.I.E.; Colonel J. K. Trotter, C.B., C.M.G., R.A.; Commander David Wilson-Barker, R.N.R., F.R.S.E.

THE ANNUAL DINNER.

The Annual Dinner of the Society was held in the evening at the Hôtel Métropole, Sir Clements R. Markham (the President) in the chair. There was a large and distinguished gathering, including Sir William Ramsay, Sir Montagu Ommanney, Sir Walter Phillimore, Sir Fleetwood Wilson, Prof. Henri Cordier (President of the Paris Geographical Society), the Agents-General for New Zealand and Queensland, the Consul-General for Sweden and Norway, Sir Harry Johnston, Sir George Vyvyan, Sir Horace Walpole, Sir Henry Yorke, Colonel Sir Thomas Holdich, Sir Thomas Blomefield, Field-Marshal Sir Henry Norman, Sir J. B. Robinson, General Sir Harry Prendergast, Admiral Sir Albert H. Markham, Admiral Sir Vesey Hamilton, Colonel Sir C. Scott-Moncrieff, Admiral Sir Lewis Beaumont, Mr. A. B. Kempe (Treasurer of the Royal Society), Major L. Darwin, Mr. J. F. Hughes, Mr. E. L. Cocks, Mr. Spenser Wilkinson, Colonel J. K. Trotter, Mr. L. Breitmeyer, and Captain Egerton. After the loyal toasts had been honoured—

The President proposed "The Medallists, Sir Harry Johnston and Captain Scott." Sir Harry Johnston replied for himself, and Captain Egerton, in the absence of Prince Louis of Battenburg, responded on behalf of Captain Scott. The President, in proposing "The Antarctic Expedition," regretted that the President of the Royal Society was not able to be present, for that Society and the Geographical Society had worked together in the most friendly spirit. He did not propose success to the Antarctic Expedition—that was assured; but he proposed "a happy return." So far they had had only the mere outline of what had been done; but the full details would be most interesting and important from a geographical point of view. Lieut. E. H. Shackleton responded. Major L. Darwin proposed "The Guests," and Prof. Henri Cordier and Sir William Ramsay responded. Sir Horace Tozer submitted the toast of "The President and the Society," and Sir Clements Markham replied.

Thirteenth Ordinary Meeting, May 30, 1904.—Sir Clements Markham, K.C.B., F.R.S., President, in the Chair.

Elections.—*Henry Forsey Brion; G. W. Dawes; Robert Hinde Douglas; Major Gilbert Sutherland McDowell, R.E.; R. Talbot Kelly: J. McPherson; Rev. Edward Blackmore Rankin; C. A. E. Rodgers, M.A.; William Lord Smith.*

The paper read was:—

"A Journey to the North of the Argentine Republic." By Florence O'Driscoll, Esq.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce.
C. Rd. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
k u. k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. = Memoirs, Mémoires.
Met. = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Austria—Bosnia and Herzegovina. *Globus* 85 (1904): 221–226. **Kaiser.**

Landschaftliche Charakterbilder aus Bosnien und der Herzegowina. Von T. Kaiser. *With Illustrations.*

Austria—Herzegovina. *Trav. G. Tchèques* 3 (1902): pp. 71. **Daneš.**

Bevölkerungsdichtigkeit der Hercegovina. Von Dr. Georg V. Daneš. *Presented by the Author.*

See note in the Monthly Record for June.

Austria—Historical. **Pichler.**

Quellen u. Forsch. alten Gesch. u. G., Heft 2–4 (1902–1904): pp. 444.

Austria Romana. Geographisches Lexikon aller zu Römerzeiten in Östreich genannten Berge, Flüsse, Häfen, Inseln, Länder, Meere, Postorte, Seeen, Städte, Strassen, Völker. Von Fritz Pichler. *With Map.*

Balkan Peninsula—Cartography. *G.Z.* 10 (1904): 158–165. **Oestreich.**

Die Geschichte der Kartographie der südosteuropäischen Halbinsel. Von Dr. K. Oestreich.

Central Europe—Historical. **Kretschmer.**

Historische Geographie von Mitteleuropa. Von Prof. Dr. K. Kretschmer. (Handbuch der mittelalterlichen und neueren Geschichte. Herausgegeben von G. von Below und F. Meinecke. Abteilung iv.: Hilfswissenschaften und Altertümer.) München und Berlin: R. Oldenbourg, 1904. Size 10 × 6½, pp. viii. and 650. *Price* 15*s.* [To be reviewed.]

Europe. **Itschner.**

Lehrproben zur Länderkunde von Europa. Ein Beitrag zum Problem der Stoffgestaltung von Hermann Itschner. Leipzig und Berlin: B. G. Teubner, 1904. Size 9½ × 6½, pp. 278. *Price* 3*s.* 9*d.*

An outline of the geography of Europe as a sample of a school course on the subject.

Europe—Lakes. **Halbfass.**

Die Morphometrie der Europäischen Seen. Von Prof. Dr. W. Halbfass. (Sonderabdruck aus der Zeitschrift der Gesellschaft für Erdkunde zu Berlin. Jahrgang 1903, No. 8, 9, 10, und 1904, No. 3.) Size 10½ × 7, pp. [108]. *Presented by the Author.*

A tabularized summary of the results of the active limnological work prosecuted in Europe during the past dozen years.

France—Forests. *La G., B.S.G. Paris* **9** (1904): 197–204. ——

Destruction des forêts et des parcs en France et à Paris depuis un Siècle. *With Plans.*

France—Provence. *B.S.G. Marseille* **27** (1903): 245–262. **Gaffarel.**

En Provence: La Ciotat et ses environs. Par M. le Prof. P. Gaffarel. *With Map.*

Germany. *VIII. Jahresb. G. Ges. Greifswald* (1900–1903): 141–243. **Elbert.**

Die Entwicklung des Bodenreliefs von Vorpommern und Rügen, sowie den angrenzenden Gebieten der Uckermark und Mecklenburgs während der letzten diluvialen Vereisung. Von J. Elbert. *With Plates.*

Germany. *G.Z.* **10** (1904): 168–169. **Henkel.**

Ist die deutsche Kleinstaaterei geographisch bedingt. Von Dr. L. Henkel.

Germany—Hessen. *G. M. aus Hessen* **3** (1903): 167–197 **Sievers.**

Kleine geographische Mitteilungen aus Hessen. Von Prof. Dr. Wilh. Sievers.

Germany—Hessen. *G. M. aus Hessen* **3** (1903): 116–166. **Zörb.**

Volksdichte der Grossherzoglich Hessischen Provinz Rheinhessen. Auf Grund der Volkszählung vom 1 Dezember 1900. Von Karl Zörb. *Map.*

Germany—Mecklenburg. *G. Anzeiger* **5** (1904): 25–26. **Wigand.**

Der Landverlust der Mecklenburgischen Küste. Von Dr. Georg Wigand.

Germany—Mountains. *G.Z.* **10** (1904): 13–25, 86–95, 134–143. **Hettner.**

Die deutschen Mittelgebirge. Versuch einer vergleichenden Charakteristik. Von A. Hettner.

Germany—Prussia—Debrong Lake. **Braun.**

Berichte Fischerei—V. Ostpreussen (1903–4): 29–30.

Beschreibung des Debrongsees. Von Dr. Gustav Braun. *Map. Presented by the Author.*

Germany—Races. *Quellen u. Forsch. alten Gesch. u. G.*, Heft 7 (1904): pp. 102. **Schmidt.**

Geschichte der deutschen Stämme bis zum Ausgange der Völkerwanderung. Von Dr. L. Schmidt. I. Abt. A.B., 1. Buch.

Germany—Rügen. *VIII. Jahresb. G. Ges. Greifswald* (1900–1903): 37–110. **Krause.**

Volksdichte und Siedelungsverhältnisse der Insel Rügen. Von Dr. R. Krause. *With Map.*

Germany—Saxony. **Richter.**

Litteratur der Landes- und Volkskunde des Königreichs Sachsen. Von P. E. Richter. Nachtrag 4. Herausgegeben von den Vereinen für Erdkunde zu Dresden und Leipzig. Dresden: A. Huhle, 1903. Size 9 × 6, pp. 220.

Greece. **Philippson.**

Ueber den Stand der geologischen Kenntnis von Griechenland. Von Prof. Dr. A. Philippson. (Comptes Rendus IX. Congrès géol. Internat. de Vienne 1903.) Wien, 1904. Size 10½ × 7½, pp. 371–382. *Presented by the Author.*

Iceland. **Vidalin.**

Trade of Iceland for the years 1900–1902. Foreign Office, Annual No. 3138, 1904. Size 10 × 6, pp. 18. *Price* 1½*d.*

Italy. **Deecke.**

Italy, a Popular Account of the Country, its People, and its Institutions (including Malta and Sardinia). By Prof. W. Deecke. Translated by H. A. Nesbitt. London: Sonnenschein & Co., 1904. Size 10½ × 7, pp. xii. and 486. *Maps and Illustrations. Presented by the Publishers.* [To be reviewed.]

Italy—Arno. **Oberti.**

Eugenio Oberti. Il bacino dell' Arno. Firenze, Tip. di M. Ricci, 1903. Size 9 × 6, pp. 72. *Presented by the Author.*

Cf. notice of paper by the same author in the *Journal* for January, 1903 (p. 74).

Jura Mountains—Geology. **Brückner.**

Notice Preliminaire sur la Morphologie du Jura Suisse et Français. Par Ed. Brückner. (Extrait des Archives des Sciences physiques et naturelles, 1902: 633–641). Geneva, 1902. Size 9 × 8½, pp. 9.

Mediterranean—Cyprus. **Foglietta.**

The Sieges of Nicosia and Famagusta in Cyprus. Related by Uberto Foglietta. Translated by Claude Delaval Cobham. London, 1903. Size 8½ × 5½, pp. 32. *Presented by the Translator.*

Mediterranean—Cyprus. **Hutchinson and Cobham.**

A Handbook of Cyprus. Compiled by Sir J. T. Hutchinson and C. D. Cobham, C.M.G. London: Waterlow & Sons. Size 7½ × 5, pp. xii. and 112. *Frontispiece and Maps. Price* 2*s.* 6*d. net.*

Norway. *La G., B.S.G. Paris* **9** (1904): 207–210. **Rabot.**

Débâcle glaciaire en Norvège. Par C. Rabot. *With Illustrations.*

Pyrenees—Water-power. *B.S.G. Com. Bordeaux* **30** (1904): 113–118. **Descombes.**

La Houille Blanche et les Indivisions de la Propriété dans les Pyrénées. Par P. Descombes.

Scandinavia. *B.S.G. Lille* **41** (1904): 13–30. **Synnestvedt.**

L'avenir économique de la Péninsule Scandinave. Par M. Synnestvedt.

Sweden. **Sundbärg.**

Sweden, its People and its Industry. Historical and Statistical Handbook published by order of the Government. Edited by Gustav Sundbärg. Stockholm: P. A. Norstedt & Söner, 1904. Size 9½ × 6½, pp. xii. and 1142. *Maps and Illustrations. Presented by the Bureau Central de Statistique de Suède.*

Turkey—Albania and Macedonia. *M.K.K.G. Ges. Wien* **46** (1903): 370–390. **Stransky.**

Reise durch Albanien und Makedonien im Sommer 1903. Von Gottfried Stransky.

United Kingdom—Ireland. *Geolog. Mag.* **10** (1903): 501–503. **Muff.**

On a Preglacial or Early Glacial Raised Beach in County Cork. By H. B. Muff.

United Kingdom—Rainfall. **Mill.**

On Distribution of Mean and Extreme Annual Rainfall over the British Isles. By Hugh Robert Mill, D.SC., LL.D. With an abstract of the discussion upon the paper. (Excerpt *Minutes of Proceedings of the Institution of Civil Engineers*, vol. clv. pp. 293–373.) London, 1904. Size 8½ × 5½, pp. 83.

United Kingdom—Rainfall. *Symons' Meteorolog. Mag.* **39** (1904): 41–43. ——

The Rainfall of the Winter Months. *With Diagrams.*

United Kingdom—Scotland. **Maclagan-Wedderburn.**

Seiches observed in Loch Ness. By E. Maclagan-Wedderburn. (Reprint from the *Proceedings of the Royal Society of Edinburgh*, vol. xxv. Part i.) Edinburgh: R. Grant & Son, 1904. Size 9 × 5½, pp. 2.

United Kingdom—Scotland. **Leyden.**

Journal of a Tour in the Highlands and Western Islands of Scotland in 1800. By John Leyden. Edited, with a Bibliography, by James Sinton. Edinburgh and London: W. Blackwood & Sons, 1903. Size 8 × 5½, pp. xviii. and 318. *Price* 6*s. net.*

The journal (a portion of which is in the form of letters to Sir W. Scott and other friends) is now printed for the first time, and gives an interesting view of the state of the highlands a century ago. The author left for India in 1803, and became in time a distinguished orientalist.

United Kingdom—Yorkshire. **Dakyns.**

P. Yorkshire Geolog. and Polytechnic S. **15** (1903): 52–58.

Notes on the Glacial Phenomena of part of Wharfedale, near Grassington, from my MS. written in 1878. By J. R. Dakyns.

United Kingdom—Yorkshire. **Howarth.**

P. Yorkshire Geolog. and Polytechnic S. **15** (1903): 46–51.

Notes on Boulder Markings on Mr. Kendall's map of the Glacier Lakes in the Cleveland Hills. By J. H. Howarth.

United Kingdom—Yorkshire. **Kendall.**

P. Yorkshire Geolog. and Polytechnic S. **15** (1903): 1–45

The Glacier Lakes of Cleveland, [with] Supplementary observations. By P. F. Kendall. *With Maps and Illustrations.*

ASIA.

China—Grand Canal. **Gandar.**

Le Canal Impérial. Étude historique et descriptive par le P. Dominique Gandar, S.J. (Variétés Sinologiques No. 4.) Chang-hai, 1903. Size 10 × 6½, pp. 78. *Maps.*

China—Manchuria. *Rev. Française* **29** (1904): 155–165. **Barré.**

La Mandchourie. Par P. Barré. *With Map.*

China—Manchuria. *Fortnightly Rev.* **75** (1904): 561–571. **Beresford.**

From Harbin to Mukden. By Col. C. E. de la Poer Beresford.

China—Manchuria. *National G. Mag.* **15** (1904): 113–127. **Miller.**

Russian development of Manchuria. By H. B. Miller. *With Illustrations.*

China—Mongolia. **Campbell.**

China. No. 1 (1904). Report by Mr. C. W. Campbell, His Majesty's Consul at Wuchow, on a Journey in Mongolia. London: Eyre & Spottiswoode, 1904. Size 13 × 8½, pp. 44. *Map. Price* 10½*d.*

The journey is that of 1902, described before the Society last year (*Journal*, November, 1903).

China—Yunnan. **Litton.**

Report by Acting Consul [G.] Litton on a Journey in North-west Yünnan. China. No. 3, [1903]. Size 13 × 8½, pp. 23. *Price* 10½*d. Maps.*

See note in Monthly Record for June.

French Indo-China. **Pavie.**

Mission Pavie Indo-Chine 1879–1895. Géographie et Voyages. I. Exposé des Travaux de la Mission (Introduction, première et deuxième périodes—1879 à 1889). Par Auguste Pavie. Paris: E. Leroux, 1901. Size 11 × 9, pp. 334. *Map and Illustrations. Presented by M. Pavie.*

India. **Cotton.**

New India, or India in Transition. By Sir H. J. S. Cotton, K.C.S.I. New Edition. London: Paul & Co., 1904. Size 8 × 5, pp. x. and 252. *Price* 3*s.* 6*d. net. Presented by the Publishers.*

The author's object in writing this book is "to draw attention to the great changes which are taking place in India . . . and to the spirit which, in my judgment, should inspire our policy in relation to them."

India. **Dutt.**

India in the Victorian Age—an Economic History of the People. By R. Dutt. London: Paul & Co., 1904. Size 8½ × 5½, pp. xxii. and 628. *Price* 10*s.* 6*d. net. Presented by the Publishers.*

Largely an indictment of British policy in regard to Indian economic questions, which, the author holds, is progressively impoverishing the people.

India—Himalayas. **Wood.**

Report on the Identification and Nomenclature of the Himalayan Peaks as seen from Katmandu, Nepal. By Captain H. Wood. With Preface by Col. St. G. Gore, C.S.I. Calcutta: 1904. Size 13½ × 8½, pp. iv., 8, and iv. *Map and Profiles.*

Captain Wood claims that his bearings and photographs prove that Mount Everest, as seen from both Kaulia and Mahadeo Pokra, is the least imposing of all the great peaks; that it stands quite apart from the Gaurisankar group; and that the group photographed by Dr. Boeck (*Journal*, vol. xxi. p. 295) is not the Gaurisankar seen from the parade ground at Katmandu, but another group considerably further west.

Japan. **Clement.**

A Handbook of Modern Japan. By E. W. Clement. London: Paul & Co., 1904. Size 7½ × 5, pp. xiv. and 396. *Maps and Illustrations. Price* 6*s. net. Presented by the Publishers.*

Useful as presenting a general view of Japan, its people, history, literature, and systems of law and government; in fact, all the points on which information is likely to be sought either by the general reader or the visitor to the country. It is not meant, however, to serve the purpose of a guide-book.

Malay Archipelago—Java. **Louw.**

De Java-Oorlog van 1825–30 door P. J. F. Louw. Derde Deel. Batavia: Landsdrukkerij; 's Hage: M. Nijhoff. 1904. Size 11 × 7½, pp. xxii. and 704. *Maps. Presented by the Bataviaasch Genootschap van Kunsten en Wetenschappen.*

Philippine Islands. *National G. Mag.* **15** (1904): 91–112. **Gannett.**

The Philippine Islands and their People. By H. Gannett. *With Illustrations.*

Siam. *B. Comité l'Asie Française* **4** (1904): 76–85. **Caix.**

Un nouveau traité franco-siamois. Par Robert de Caix. *With Maps.*

See note in the Monthly Record for May.

Siam. *Rev. Française* **29** (1904): 129–144. **Salaignac.**

Le nouveau traité avec le Siam. Par A. Salaignac. *With Map.*

Western Asia. *G.Z.* **10** (1904): 165–168. **Zimmerer.**
Die wirtschaftliche Bedeutung West-Asiens. Von Prof. Dr. H. Zimmerer.

AFRICA.

Africa. **Gibbons.**
Africa from South to North through Marotseland. By Major A. St. H. Gibbons. 2 vols. London and New York: John Lane, 1904. Size 9 × 6, pp. (vol. i.) xx. and 276; (vol. ii.) xxii. and 298. *Map and Illustrations. Price 32s. net. Presented by the Publisher.* [To be reviewed.]

Cape Colony—Meteorology. *T. South African Philos. S.* **14** (1903): 403–408. **Marloth.**
Results of Experiments on Table Mountain for ascertaining the amount of Moisture deposited from the S.E. Clouds. By R. Marloth.
See note in the Monthly Record (*ante*, p. 96).

Central Africa—Lakes. *Mouvement G.* **21** (1904): 157–160. **[Wauters.]**
L'Écoulement des Lacs Kivu et Bangweolo. Par A. J. W. *Map.*

Central Sudan. *La G., B.S.G. Paris* **9** (1904): 161–176. **D'Huart.**
Le Tchad et ses habitants. Notes de Géographie physique et humaine. Par — D'Huart.

Congo. *Trav. G. Tchèques* **1** (1901): pp. 142. **Švambera.**
Kongo. Napsal Dr. V. Švambera. I. *Presented by the Author.*

Congo State—Welle. *Mouv. G.* **21** (1904): 125–126. **Lemaire.**
Le Cours de l'Uele. Par le Commandant Ch. Lemaire.
Records a large number of determinations of position made by Capt. Lemaire.

Egypt—Baharia Oasis. **Ball and Beadnell.**
Baharia Oasis: its Topography and Geology. By John Ball and Hugh J. L. Beadnell. Cairo, 1903. Size 11 × 7½, pp. 84. *Maps and Plates. Presented by the Director-General, Survey Department, Egypt.*

Egypt—Irrigation. **Willcocks.**
The Assuan Reservoir and Lake Moeris. By Sir William Willcocks. London: 1904. Size 11 × 7, pp. 35. *Plates. Presented by the Author.*
Noticed in the Monthly Record, *ante*.

Egypt and the Sudan. **Cromer.**
Egypt, No. 1 (1904). Reports by His Majesty's Agent and Consul-General on the Finances, Administration, and Condition of Egypt and the Soudan in 1903. London: Eyre & Spottiswoode, 1904. Size 13½ × 8½, pp. iv. and 100. *Price* 10½*d.*
See note in the Monthly Record.

French Congo. *Questions Dipl. et Colon.* **17** (1904): 233–242. **Terrier.**
La réorganisation du Congo français et la mission Lenfant. Par A. Terrier. *With Map.*

French Congo. *La G., B.S.G. Paris* **9** (1904): 232–234. ——
Reconnaissances géographiques dans le bassin de l'Ogôoué. *With Map.*

German E. Africa—Uhehe. *Beitr. Kolonialpolitik* **5** (1903–4): 309–322. **Schlagintweit.**
Die Tegernseen in Uhehe. Von Major Max Schlagintweit.

German S.W. Africa—Afforestation. *Globus* **85** (1904): 134–136. **Gessert.**
Zur Aufforstungsfrage in Südwestafrika. Von Ferd. Gessert.

Kamerun. *Globus* **85** (1904): 1–6, 73–77. **Engelhardt.**
Eine Reise durch das Land der Mwele und Esum, Kamerun. Von Hauptmann P. Engelhardt. *With Map and Illustrations.*

Kamerun—Exploration. *Beitr. Kolonialpolitik* **5** (1903–4): 289–294. **Moisel.**
Stand der Geographischen Erforschung Kameruns Ende 1903. Von M. Moisel. *Map.*

Komoro Islands. *Rev. Colon.*, **No. 16** (1904): 387–406. **Plantier.**
La Grande-Comore; sa colonisation. Par le Dr. Nicolas du Plantier. *With Map.*

Nigeria—Economic Products. **Dunstan.**
Northern Nigeria. Colonial Reports, No. 26, December 18, 1903. Report on a Series of Mineral and Vegetable Products. By Prof. W. R. Dunstan. Size 9½ × 6, pp. 26. *Price* 2*d.*

North-east Africa. *Z. Ges. Erdk. Berlin* (1904): 89–131. **Erlanger and Sprigade.**

Bericht über meine Expedition in Nordost-Afrika in den Jahren 1899–91. Von Carlo Freiherr v. Erlanger.

Geographische Ergebnisse der Expedition von Carlo Frhr. v. Erlanger in Nordost-Afrika in den Jahren 1899–1901. Von P. Sprigade. *With Maps. Also separate copy, presented by Herr P. Sprigade.* [See note in Monthly Record for June.]

Somaliland—Trade.

Report on the Trade and Commerce of the Somaliland Protectorate, 1902–3. Africa, No. 2 (1904). Size 13 × 8½, pp. 45. *Price* 5*d.*

West Africa. *Scottish G. Mag.* **20** (1904): 134–143. **Morel.**

The Economic Development of West Africa. By Edmund D. Morel.

Paper read at the Southport meeting of the British Association.

West Africa—Early Travel. **Jobson.**

The Golden Trade or a Discovery of the River Gambra, and the Golden Trade of the Aethiopians. By Richard Jobson. 1623. Now reprinted for the First Time. Edited by Charles G. Kingsley, with woodcut ornamentation based on West African designs by R. Morton Nance. Teignmouth: E. E. Speight & R. H. Walpole, [*not dated*]. Size 9 × 7, pp. xviii. and 210.

The first of a series of reprints of old travels, produced in excellent style.

NORTH AMERICA.

Canada—Geology. *Petermanns M.* **50** (1904): 20–28, 47–55. **Haas.**

Zur Geologie von Canada. Von Prof. Dr. Hippolyt Haas. *With Map.*

United States. *J. Geology* **12** (1904): 34–39. **White.**

The Appalachian River *versus* a Tertiary Trans-Appalachian River in Eastern Tennessee. By C. H. White.

United States—Arizona. *J. Franklin I.* **157** (1904): 293–311. **Carter.**

The Petrified Forests and Painted Desert of Arizona. By Prof. Oscar C. S. Carter. *Map and Illustrations.*

United States—Colorado. *J. Geology* **12** (1904): 30–33. **Henderson.**

Arapahoe Glacier in 1903. By J. Henderson. *With Diagram.*

United States—Great Basin. **Davis.**

B. Museum Comparative Zoology **42** (1903): 129–178.

The Mountain Ranges of the Great Basin. By W. M. Davis. *With Illustrations.*

United States—Irrigation. *National G. Mag.* **15** (1904): 15–30. **Newell.**

The Reclamation of the West. By F. H. Newell. *With Maps and Illustrations.*

United States—Maryland. **McCormac.**

White Servitude in Maryland, 1634–1820. By E. I. McCormac. (Johns Hopkins University Studies, Series xxii., Nos. 3–4.) Baltimore, 1904. Size 10 × 6, pp. 112.

United States—Maryland. **Steiner.**

Beginnings of Maryland, 1631–1639. By B. C. Steiner, PH.D. (Johns Hopkins University Studies, Series xxi., Nos. 8–10.) Baltimore, 1903. Size 10 × 6, pp. 112.

United States—Mississippi. *Science* **19** (1904): 601–609. **Taylor.**

Levees, Outlets and Reservoirs as Means for Protection against Overflow of the Alluvial Lands of the Mississippi Valley below Cairo. By R. S. Taylor. *With Map.*

United States—Mississippi—Historical. **Ogg.**

The Opening of the Mississippi. A Struggle for Supremacy in the American Interior. By F. A. Ogg. New York: the Macmillan Co., 1904. Size 8 × 5½, pp. xii. and 670. *Maps. Price* 8*s.* 6*d.*

Although dealing to some extent with ground covered by the works of Winsor, Parkman, and others, this will be useful to the student and general reader from the fact that it supplies a broad view of the history of early European enterprise in the Mississippi basin, without entering into the minute details to be found in more pretentious historical works.

United States—New Hampshire. *J. Geology* **12** (1904): 1–14. **Perry.**

Geology of Monadnock Mountain, New Hampshire. By J. H. Perry. *With Map and Illustrations.*

CENTRAL AND SOUTH AMERICA.

Argentine Republic. *Deutsch. Rundschau G.* **26** (1904): 251–255. **Cappus.**
Die Wassersperren des Rio Primero in Argentinien. Von W. Cappus. *With Map and Illustrations.*

On the regularization of the Rio Primero near Córdoba by a dam, for the purposes of irrigation and the avoidance of destructive floods.

Argentine Republic—Altitudes. *B.A. Nac. Ci. Córdoba* **13** (1892): 45–150. **Seelstrang.**
Alturas de la Républica Argentina. Por Arturo Seelstrang.

Argentine Republic—Andes. *B.A. Nac. Ci. Córdoba* **13** (1892): 5–44 **Bodenbender.**
Sobre el terreno jurásico y cretáceo en los Andes argentinos entre el rio Diamante y el rio Limay. Por Guillermo Bodenbender.

Bolivia and Brazil. ———
Monthly B. Internat. Bureau American Rep. **16** (1904): 642–647.
Final Decision of the Acre Question. Boundary Treaty between Bolivia and Brazil.

Brazil—Climatology. *Pet. M., Ergänzungsheft* **145** (1904): pp. 48. **Voss.**
Beiträge zur Klimatologie der südlichen Staaten von Brasilien. Von E. L. Voss. *Map.*

Brazil—Meteorology. *Meteor. Z.* **21** (1904): 62–72. **Hann.**
Die Beobachtungs-Ergebnisse am meteorologischen Observatorium erster Ordnung zu Curityba, Staat Paraná, Brasilien. Von J. Hann.

Central America—Canal. *Fortnightly Rev.* **75** (1904): 670–683. **Uzanne.**
The Inter-Oceanic Canal—Nicaragua or Panama? By Octave Uzanne.

Chile—Chiloé. **Webers.**
Chiloé: Su estado actual.—Su colonizacion.—Su porvenir. Por Alfredo Webers. Santiago de Chile, 1903. Size 10½ × 7½, pp. 194. *Map.*

Chile—Valparaiso. **Fagalde.**
Alberto Fagalde. El puerto de Valparaiso i sus obras de mejoramiento. Size 11 × 8, pp. 158. *Plan and Illustrations. Presented by the Chilean Hydrographic Office.*

Ecuador. *Z. Ges. Erdk. Berlin* (1904): 49–61, 132–150. **Meyer.**
Reisen im Hochland von Ecuador. Von Prof. Dr. H. Meyer.
See note in the *Journal* for December, 1903 (p. 701).

Falkland Islands and Tierra del Fuego. **Andersson.**
Ann. S. Científica Argentina **55** (1903): 19–22.
Trabajos efectuados en las Islas Malvinas y en la Tierra del Fuego por la Expedición sueca al Polo Sud. Por J. G. Andersson.

Jamaica. **Ford and Finlay.**
The Handbook of Jamaica for 1904. Compiled . . . by J. C. Ford and A. A. C. Finlay. London: E. Stanford. 1904. Size 8½ × 6, pp. viii. and 532. *Map. Price 7s. 6d. net. Presented by the Publisher.*

Martinique. *American J. Sci.* **16** (1903): 270–281. **Hovey.**
The New Cone of Mont Pelé and the Gorge of the Rivière Blanche, Martinique. By Edmund O. Hovey. *Illustrations.*

Salvador. *Ann. Museo Nacional* **1** (1904): 298–308. **Guzmán.**
Repoblación de los bosques salvadoreños. Obra inedita del Dr. David J. Guzmán.

South America—Watershed. *G.M. aus Hessen* **3** (1903): 1–115. **Wagner.**
Die Wasserscheide in Südamerika südlich von 40° S. Br. Eine quellenkritische Studie über den Chilenischargentinischen Grenzstreit und dessen geographische Ergebnisse. Von Heinrich Wagner.

AUSTRALASIA AND PACIFIC ISLANDS.

Marcus Island. **Bryan.**
Occasional Papers, Bernice Pauahi Bishop Museum **2** (1902): 77–139.
A Monograph of Marcus Island. By William Alanson Bryan. *Map and Illustrations.*

New Britain. *Globus* **85** (1904): 136-140. **Rascher.**

Eine Reise quer durch die Gazelle-Halbinsel (Neu-Pommern). Von P. M. Rascher.

New Britain. **Wolff.**

Emil Wolff. Die Durchquerung der Gazelle-Halbinsel, Bismarckarchipel. (Abteilung Berlin-Charlottenburg der Deutschen Kolonial-Gesellschaft. Verhandlungen 1903-1904, Band viii., Heft 2.) Berlin: D. Reimer (Ernst Vohsen), 1904. Size 9 × 6, pp. 32-54. *Price* 63 *pf. Presented by the Publisher.*

See note in Monthly Record for June.

New Guinea. *J. Camera Club* **18** (1904): 30-33. **Abbot**

Three Years in New Guinea. By the Rev. W. H. Abbot.

Pacific and Indian Oceans. **Tolna.**

C^te^ R. Festetics de Tolna. Chez les Cannibales. Huit ans de croisière dans l'Océan Pacifique à bord du yacht *Le Tolna*. The same. Vers l'écueil de Minicoy après huit ans dans l'Océan Pacifique et Indien à bord du yacht *Le Tolna*. Paris: Plon-Nourrit et C^ie^, 1903-1904. Size 11 × 7½, pp. iv., 408, and 396. *Maps and Illustrations. Price* £1 12*s.*

The islands visited included, among others, the Melanesian groups of the New Hebrides, the Solomon islands, New Britain, etc, the voyage ending with a shipwreck and detention at Minicoy. There are numerous photographs, many of native types.

South Australia. ——

A Short Review of Mining Operations in the State of South Australia during the year 1903. Adelaide, 1904. Size 10 × 6½, pp. 12.

POLAR REGIONS.

Antarctic—German Expedition. *Z. Ges. Erdk. Berlin* (1904): 14-41. **Drygalski.**

Bericht über Verlauf und Ergebnisse der Deutschen Südpolar-Expedition. Von E. von Drygalski. *With Maps and Illustrations.*

Antarctic—Scottish Expedition. *Scottish G. Mag.* **20** (1904): 57-66, 113-133. ——

First Antarctic Voyage of the *Scotia*. *Illustrations.*

The second instalment consists of the scientific reports of the leader and staff.

Arctic. *B. Musée Océanogr. Monaco, No.* **2** (1904): pp. 30. **Bénard.**

Projet d'Expédition Océanographique double à travers le Bassin Polaire Arctique. Par M. Charles Bénard. *Illustrations.*

Arctic—Greenland Sea. *Ann. Hydrographie* **32** (1904): 49-69. **Brennecke.**

Beziehungen zwischen der Luftdruckverteilung und den Eisverhältnissen des Ostgrönländischen Meeres. Von Wilhelm Brennecke.

Noticed in the Monthly Record, *ante*, p. 99.

Arctic—Meteorology. *La G., B.S.G. Paris* **9** (1904): 177-187. **Simmons.**

Observations météorologiques faites dans l'archipel polaire Américain par l'expédition Sverdrup. Par H. G. Simmons.

Arctic—Peary Expedition. *B.G.S. Philadelphia* **4** (1904): pp. 48. **Peary.**

Field Work of the Peary Arctic Club, 1898-1902. By Commander R. E. Peary. *Illustrations.*

MATHEMATICAL GEOGRAPHY.

Changes of Level. *Veröffentl. Preuss. Geod. I.* **14** (1904): 42 pp. **Schumann.**

Ergebnisse einer Untersuchung über Veränderungen von Höhenunterschieden auf dem Telegraphenberge bei Potsdam. Von Dr. R. Schumann.

Measurement of Altitudes. **Liznar.**

Die barometrische Höhenmessung. Mit neuen Tafeln, welche den Höhenunterschied ohne Zuhilfenahme von Logarithmentafeln zu berechnen gestatten. Von J. Liznar. Leipzig und Wien: F. Deuticke, 1904. Size 10 × 7, pp. 48. *Price* 2*m. Presented by the Publisher.*

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Earth Temperature. *Meteor. Z.* **21** (1903): 50-62. **Woeikof.**

Probleme der Bodentemperatur. Typen ihrer vertikalen Verbreitung. Verhältnis zur Lufttemperatur. Von A. Woeikof.

Geology. **Chamberlin and Salisbury.**

Geology. By T. C. Chamberlin and R. D. Salisbury. Vol. i.—Geologic Processes and their results. New York: H. Holt & Co., 1904. Size 9 × 6, pp. xx. and 654. *Maps and Illustrations. Presented by the Publishers.*

Geo-physics. *C. Rd.* **138** (1904): 712–714. **Launay.**

Sur la répartition des éléments chimiques dans la terre et sa relation possible avec leurs poids atomiques. Note de L. De Launay.

Glacial Epoch. *VIII. Jahresb. G. Ges. Greifswald* (1900–1903): 1–16. **Credner.**

Das Eiszeit-Problem. Wesen und Verlauf der diluvialen Eiszeit. Ein Vortrag von R. Credner.

Glaciation. **Crammer**

Eis- und Gletscherstudien. Von Hans Crammer. Stuttgart, 1903. Size 9 × 6½, pp. 116. *Illustrations. Presented by the Author.*

See note in Monthly Record for April (p. 526, *ante*).

Glaciers. *Deutsch. Rundschau G.* **26** (1904): 241–251. **Neuber.**

Gletscherarbeit. Von A. Neuber. *With Illustration.*

On glacial erosion, etc., illustrated from personal observation.

Hydrology—Ground-water. *Meteorolog. Z.* **20** (1903): 364–367. **Weyde.**

Die Abhängigkeit des Grundwasserstandes von dem Luftdrucke, dessen Steigen und Fallen während eines Tages (Flut und Ebbe). Von Prof. F. Weyde.

Hydrology—Whirlpools. *C. Rd.* **138** (1904): 915–917. **Brunhes.**

Sur le sens de rotation des tourbillons d'eaux courantes dans l'Europe Centrale. Note de J. Brunhes.

Cf. note on Messrs. Brunhes' former researches, vol. xxiii. p. 526.

Meteorology. **Garriott.**

Weather Folk-Lore and Local Weather Signs. Prepared by E. B. Garriott. (U.S. Department of Agricultural. Weather Bureau. Bulletin No. 33). Washington, 1903. Size 9½ × 6, pp. 154. *Charts. Presented by the U.S. Weather Bureau.*

Meteorology. **Lapparent.**

La Pluie et Le Beau Temps. Par A. De Lapparent. Paris, 1904. (Extrait du Correspondant). Size 9½ × 6, pp. 23. *Presented by the Author.*

Meteorology—Evaporation. *Meteorolog. Z.* **20** (1903): 380–384. **Okada.**

Vergleichende Messungen der Verdunstung des Meerwassers und des Süsswassers. Von T. Okada.

Meteorology—"Pola" Expedition. *Meteorolog. Z.* **20** (1903): 347–360. **Hann.**

Die meteorologischen Ergebnisse der Expedition Sr. M. Schiff "Pola" in das Rote Meer 1895–96 und 1897–98. Von J. Hann.

Meteorology—Rain Register. **Mill.**

Pocket Rain Register. Designed by Dr. H. R. Mill. London, 1903. Size 9 × 6, pp. 32. Contains hints for observing rainfall.

Oceanography. *B. Musée Océanograph. Monaco No.* **9** (1904): pp. 16. **Thoulet.**

Les lois physiques de l'Océan et leurs relations avec les êtres qui l'habitent. Par J. Thoulet.

Oceanography. *C. Rd.* **138** (1904): 527–529. **Thoulet.**

Méthode physique et chimique de reconnaissance et de mesure des courants sous-marins profonds. Note de M. Thoulet.

Oceanography—Barents Sea. *Petermanns M.* **50** (1904): 35–46. **Breitfuss.**

Ozeanographische Studien über das Barents-Meer, auf Grund der Untersuchungen der wissenschaftlichen Murman-Expedition. Von Dr. L. Breitfuss. *With Map and Profiles.*

Phyto-geography. *National G. Mag.* **15** (1904): 47–49. **Russell.**

Timberlines. By I. C. Russell.

Noticed in the Monthly Record for June.

Phyto-geography—Chinchona. *La G., B.S.G. Paris* **9** (1904): 192–196. **Flahault**

Les Quinquinas, leur patrie, leur introduction dans les diverses parties du monde. Par C. Flahault. *With Diagram.*

Sand-dunes. *National G. Mag.* **15** (1904): 43–47. **Hitchcock.**

Controlling Sand-dunes in the United States and Europe. By A. S. Hitchcock. *With Illustrations.*

Terrestrial Magnetism. **Fritsche.**

Atlas des Erdmagnetismus für die Epochen 1600, 1700, 1780, 1842 und 1915. Von Dr. H. Fritsche. Riga: 1903. Size 14½ × 9, pp. 26. *Tables.*

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Ethnology. *Indian Antiquary* **32** (1903): 381–389, 417–426; **33** (1904): 10–16. **Lévi.**

Notes on the Indo-Scythians. By Sylvain Lévi. (Extracted and rendered into English by W. J. Philipps.)

Historical. *B.S.R. Belge G.* **28** (1904): 5–15. **[Reclus.]**

Les Grandes Voies historiques. *With Map.*

Historical—French Missions. **Piolet.**

La France au dehors. Les Missions Catholiques Françaises au XIX^e^ Siècle, publiées sous la direction du Père J.-B. Piolet, S.J. Avec la collaboration de toutes les Sociétés de Missions. 6 vols. Paris: A. Colin [vols. I.–III. not dated], 1902–1903. Size 11½ × 7½, pp. (vol. i.) xcvi. and 432; (vol. ii.) 512; (vol. iii.) 504; (vol. iv.) 512; (vol. v.) 512; (vol. vi.) 520. *Illustrations.*

Historical—Southern Continent. **Lee.**

The Great South Land. A Point for Historians and Geographers. By Ida Lee. (From the *Empire Review*, February, 1904, pp. 71–80.) Size 10 × 6½.

Suggests that the first discovery of the Australian continent was due to Sebastian Cabot in 1499. While showing an extensive acquaintance with the literature of the subject, the writer is of course venturing on the ground of pure hypothesis, and, whatever might be said for the view that some southern land was reached by Cabot in the year named, the idea that this was Australia is, to say the least, an extremely bold flight of imagination.

History of Geography—Alphonse de Saintonge. **Musset.**

La Cosmographie, avec l'espère et régime du soleil et du nord. Par Jean Fonteneau dit Alfonse de Saintonge. Publiée et annotée par G. Musset. (Recueil de Voyages et de Documents pour servir à l'Histoire de la Géographie depuis le XIII^e^ jusqu'à la fin du XVI^e^ siècle XX.) Paris: E. Leroux, 1904. Size 11 × 7½, pp. 600. [To be reviewed.]

Population Maps. **Brückner.**

Ueber Karten der Volksdichte. Von Prof. Dr. Ed. Brückner. 6 pp. *Map.* (Separatabdruck aus Z. für Schweiz. Statistik, 1904.)

BIOGRAPHY.

Mathews. **Coolidge.**

Un Pionnier des Alpes Françaises, William Mathews. Par W.-A.-B. Coolidge. Lyon, 1904. Size 9½ × 6, pp. 23. *Presented by the Author.*

Radde. *Leopoldina* **39** (1903): 121–128; 135–139. **Drude and Taschenberg.**

Gustav Radde, sein Leben und Wirken. Von Prof. Dr. O. Drude und Prof. Dr. O. Taschenberg.

GENERAL.

British Empire. **Young.**

An Address on Imperial Federation. By Sir Frederick Young. London, 1903. Size 8½ × 5½, pp. 23.

British Empire—Cotton. *J.S. Arts* **52** (1904): 439–457. **Emmott.**

Cotton-growing in the British Empire. By A. Emmott, M.P.

Educational—Wall-maps. **Wethey.**

Available School Wall-maps. By E. R. Wethey. [From the *School World*, September, 1903, pp. 324–326.] London: Macmillan & Co., 1903. Size 11 × 8.

Encyclopædia. **Meyer.**

Meyers Grosses Konversations-Lexikon. Sechste Auflage. Sechster Band. Erdeessen bis Franzén. Leipzig und Wien, Bibliographisches Institut, 1904. Size 10 × 6½, pp. 908. *Maps and Illustrations.*

Exhibition.

Catalogue of the Geographical Exhibition arranged by the Geographical Association, and shown in London and elsewhere in 1904. A supplement to the *Geographical Teacher*, vol. ii. London: G. Philip & Son. Size 10 × 6½, pp. 38. *Price* 6*d. net.*

See note in the March number (p. 393).

German Colonies.

Das Ueberseeische Deutschland. Die deutschen Kolonien in Wort und Bild. Nach dem neuesten Stand der Kenntniss bearbeitet von Hauptmann a. D. Hutter, Dr. R. Büttner, Prof. Dr. Karl Dove, Direktor A. Seidel, Director C. v. Beck, H. Seidel, Dr. Reinecke, Kapitänleutnant Deimling. Stuttgart, Berlin, Leipzig: Union Deutsche Verlagsgesellschaft, [not dated]. Size 9½ × 6½, pp. viii. and 680. *Maps and Illustrations.*

A good general account of the German possessions abroad, dealing with the history of their acquisition, their surface features and products, inhabitants and their mode of life, and so on. Each section is by a recognized authority on its subject.

German Colonies—Bibliography. **Brose.**

Die deutsche Kolonialliteratur im Jahre 1902. Zusammengestellt von M. Brose. Sonder-Heft der Beiträge zur Kolonialpolitik und Kolonialwirtschaft. Berlin: W. Süsserott, 1904. Size 9½ × 6½, pp. 64.

German Colonies—Place-names. *Deutsch. Kolonialblatt* **14** (1903): 453–454.

Grundsätze für die Namengebung, Namenübersetzung, Schreib- und Sprechweise der geographischen Namen in den deutschen Schutzgebieten.

Noticed in *Journal*, February, 1904 (p. 265).

Scientific Research. *Univ. B.* **5** (1904): pp. 24. **Russell.**

Research in State Universities. By Prof. Israel C. Russell.

Statistics. *Petermanns M., Ergänzungsheft*, No. **146** (1904): pp. 158. **Supan.**

Die Bevölkerung der Erde. XII. Amerika, Afrika, und Polarländer. Bevölkerung der Erde um die Jahrhundertwende. Von A. Supan. *With Maps.*

The statistics for Africa are particularly valuable as supplying the first trustworthy estimate, in detail, of the areas, etc., of the political divisions of the continent, since the conclusion of its partition among the Powers.

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

England and Wales. **Bartholomew.**

The Survey Atlas of England and Wales. A series of eighty-four plates of maps and plans, with Descriptive Text, illustrating the Topography, Physiography, Geology, Climate, and the Political and Commercial Features of the Country. Designed by and prepared under the direction of J. G. Bartholomew, F.R.S.E., F.R.G.S. Parts xv. and xvi. Edinburgh: John Bartholomew & Co., 1903. *Price 2s. 6d. each part. Presented by the Publishers.*

These parts contain plates 23, 24, 43, 48–50, 64, and 65, forming the following sections of the 2-miles-to-the-inch general map of England and Wales: xii. (York and Leeds), xiii. (Blackburn and Halifax), xxxii. (Peterborough), xxxvii. (Northampton and Bedford), xxxviii. (Stratford-on-Avon), xxxix. (Hereford and Malvern), liii. (Salisbury), liv. (Bath and Wells).

England and Wales. **Ordnance Survey.**

ORDNANCE SURVEY OF ENGLAND AND WALES:—Sheets published by the Director-General of the Ordnance Survey, Southampton, from June 1 to 30, 1904.

1 inch:—

(Third edition) in outline, 7, 11, 286, 1*s. each* (engraved).
(Third edition) with hills in brown or black, 7, 11, 286, 315, 1*s. each* (engraved).
District map of Llandovery, with roads printed in colour; mounted on linen, folded in cover or flat in sheets, 1*s.* 6*d.*

6-inch—County Maps (first revision):—

Gloucestershire, 67 N.W. **Herefordshire,** 2 N.E., 6 S.W., 11 S.E. **Leicestershire,** 15 S.E., 18 S.W., 26 N.W., N.E., 32 N.W., 35 S.W., 38 N.W., N.E. **Radnorshire,** 15 N.W., S.E., 17 N.W. **Shropshire,** 77 N.E., 79 S.E. **Somersetshire,** 2 N.W., S.E., 4 S.W., 14 S.W., 17 S.W., 18 N.W., 19 S.E., (24 N.E. and 25 N.W.), 25 N.E., 26 S.E., 28 N.E., S.E., 29 S.W., 43 S.E., 80 S.E., 81 S.W. **Warwickshire,** 9 N.E., 10 S.E. **Worcestershire,** 20 N.W. (First Revision of 1891 Survey). **Yorkshire,** 289 N.E., 297 S.W. 1*s. each.*

25-inch—County Maps (first revision):—
Brecknockshire, XVI. 5, 6, 7, 11, 15, 16; XXII. 12; XXIII. 2, 3, 4, 6, 7, 8, 10, 11, 12. **Devonshire,** I. 13, 14, 15, 16; II. 10, 13; IV. 2, 3, 4, 6, 7, 8, 10, 11, 12, 14, 15, 16; V. 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; VI. 1, 2, 5, 6, 9, 10, 13, 14; VIII. 1, 2, 3, 4, 5, 6, 7, 8. **Herefordshire,** VIII. 10, 14; XXXIV. 9, 13, 14; XXXIX. 9, 12, 13, 14, 15; XL. 8, 10; XLI. 6, 9, 10; XLV. 3, 4, 6, 7, 8, 9, 10, 11, 12; XLVI. 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12; XLVII. 1, 2, 5, 9, 10. **Leicestershire,** II. 3, 10, 14; VII. 1, 2, 5; XIV. 7, 15; XXI. 2, 14, 15; XXXIX. 5; XLVI. 4. **Lincolnshire,** CXXX. 3, 7, 8, 12, 15, 16; CXXXIX. 1, 2, 3, 8, 9, 11, 12, 14, 15, 16; CXLV. 3, 4, 8; CL. 3, 4, 7, 12. **Radnorshire,** XXXV. 6, 7, 11, 16; XXXVI. 13; XXXIX. 2. **Rutland,** II. 14, 15; III. 9, 14, 15; V. 1, 2, 4, 8, 9, 11, 12, 13, 14, 15, 16; VI. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; IX. 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; X. 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15. **Somersetshire,** VIII. 11; LVII. 11; LXVIII. 6, 7; LXIX. 7, 9, 10, 11, 12, 14, 15; LXX. 4, 8, 11, 12, 16; LXXI. 9; LXXVII. 4, 8; LXXIX. 1, 2, 6, 13, 14. **Staffordshire,** LXXII. 9. **Suffolk,** LII. 8, 11, 12; LIV. 1, 3, 6, 8, 9, 13, 14, 16; LV. 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16; LVI. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16; LVII. 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 16; LVIII. 2, 4, 7, 8, 10, 11, 12; LIX. 8, 10, 16; LXV. 1, 2, 3, 4; LXVI. 7, 11; LXVII. 9, 13, 14; LXVIII. 12; LXIX. 2, 5, 6, 7; LXXV. 2, 4, 5, 9; LXXVI. 5; LXXVII. 7, 15; LXXVIII. (3 and 7). **Warwickshire,** XXX. 11. **Worcestershire,** V. 9; XIII. 1, 6; XVI. 7, 9, 10, 11; XVIII. 7, 8; XXIII. 1, 2, 3, 5, 6, 7, 9, 10, 11. *3s. each.*
(*E. Stanford, London Agent.*)

France. **Brette.**
Atlas des Bailliages ou Juridictions Assimilées ayant formé Unité Électorale en 1789. Dressé d'après les Actes de la Convocation conservés aux Archives Nationales. Par Armand Brette. Recueil de Documents relatifs à la Convocation des Etats Généraux en 1789. Paris: Imprimerie Nationale, 1904.

France. **Martel and Boissaye.**
Carte de l'Estérel dressée par M. E. A. Martel avec le concours de M. P. Boissaye. Scale 1:20,000 or 3·2 inches to 1 stat. mile. Paris: Touring Club de France, 1903. *Presented by M. E. A. Martel.*

Includes the French Riviera between Saint Raphael and Théoule, and the basin of the Cabre. The map is well drawn, and printed in colours. Relief is shown by contour-lines at intervals of 50 metres; rivers and streams in blue, forests in green, and the character of all roads and paths is indicated by various symbols. Tourists and others visiting the neighbourhood will doubtless find the map useful.

Liverpool Bay. **Belam and Ashton.**
Chart of Liverpool Bay. Scale 1:36,000 or 1000 yards to an inch. Surveyed by Commander Henry Belam, R.N., Marine Surveyor, and H. G. G. Ashton, F.R.G.S., Assistant Marine Surveyor, Mersey Docks and Harbour Board. Liverpool, 1903. *Presented by H. G. G. Ashton, Esq.*, F.R.G.S.

This is a new edition, revised and corrected up to date.

London. **Bartholomew.**
Plan of East London. By John Bartholomew, F.R.G.S. Scale 1:21,120 or 3 inches to a mile. New and revised edition. London: W. H. Smith & Son, 1904. *Price 2s., mounted on cloth. Presented by Messrs. John Bartholomew & Co.*

This is a new and revised edition extended to take in the eastern boundary of the County of London.

Mediterranean Region. **Fischer.**
Die Verbreitung des Ölbaumes im Mittelmeergebiet. Von Theobald Fischer. Scale 1:10,000,000 or 157·8 stat. miles to an inch. *Petermanns Geographische Mitteilungen*, Erganzungsheft No. 147. Gotha: Justus Perthes, 1904. *Presented by the Publisher.*

ASIA.

Indian Government Surveys. **Surveyor-General of India.**
Indian Atlas, 4 miles to an inch. Sheets: 1 N.E., parts of districts Larkhana and Hyderabad, and Khairpur Native State (Sind, Bombay Presidency), additions to 1901, 1903. 1 S.E., parts of districts Karachi, Larkhana, and Hyderabad, and Native State of Khairpur (Sind, Bombay Presidency), additions and corrections to 1901. 1a S.E. parts of districts Larkhana, Sukkur, and Upper Sind Frontier (Sind, Bombay Presidency), additions and corrections to 1901, 1903. 10 N.W., parts of districts Thar and Parkar, Hyderabad and Karachi, and Native State of Khairpur (Sind, Bombay Presidency), additions and corrections to 1901. 50 N.E., parts of districts Agra, Muttra, and Aligarh (United Provinces), Gurgaon (Punjab), Bharatpur and Alwar (Native States, Rajputana Agency), additions to 1894, 1901.

53 S.W., parts of Hoshangabad and Nimar (Central Provinces), Indore, Bhopal, Dewas, Dhar, and Gwalior (C.I. Agency), additions to 1903. 53 S.E., parts of Hoshangabad and Betul (Central Provinces), and the Native States of Bhopal and Holkar (C.I. Agency), additions and corrections to 1901. 130 N.E., parts of districts Sibsagar and Naga Hills, and of Naga Tribes (Assam), additions to 1903.—District Map of India, 64 miles to an inch. 2 Sheets, 1903.—The Central Provinces, 16 miles to an inch. 2 Sheets, additions to 1902.—Part of Chih-Li Province, China, 8 miles to an inch, 1903.—India and adjacent countries, 16 miles to an inch. Sheets (Provisional issue): 78, parts of Nepal, Sikkim, Tibet, Bhutan, Bengal, and Assam, 1903; 83, parts of Bengal, Assam, and Burma, 1903.—District Gujrat (Punjab), 4 miles to an inch, 1903.—District Gurgaon (Punjab), 4 miles to an inch, 1903.—District Wardha (Central Provinces), 4 miles to an inch, 1903.—Assam Survey, 1 mile to an inch. Sheets: 51, districts Darrang and Nowgong, Seasons 1886–88, 1890–91, 1897–98, 1903; 101 and 116 (Preliminary Edition), district Sibsagar, Seasons 1888–90 and 1898–99, 1903.—Bengal Survey, 1 mile to an inch. Sheets: 113, districts Muzaffarpur and Saran, Seasons 1892–95 and 1896–99, 1903; 135, districts Cuttack and Puri, Seasons 1887–88 and 1895–96, 1903; 165, district Cuttack, Seasons 1892–95, 1903; 192 (Preliminary Edition), districts Cuttack and Balasore, Seasons 1891–95, 1903; 220, district Balasore, Seasons 1892–94, 1903.—Bombay Survey, 1 mile to an inch. Sheets: 233, district Poona, Season 1873–74, corrections and addition to railway, December 1890, 1901; 265, districts Poona, Ahmednagar, and Sholapur, Season 1874–75, additions to railways to 1886, 1903.—Bombay and Madras Surveys, 1 mile to an inch. Sheets: 337 (Bombay Survey), 24 (Madras Survey), parts of districts Dharwar (Bombay), Shimoga, and Chitaldroog (Mysore, Madras), Seasons 1882–83 and 1893–94, corrected to July 1901, 1902.—Burma Survey, 1 mile to an inch. Sheets: 117 (New Series), districts Prome, Sandoway, and Thayetmyo, Seasons 1898–99 and 1900–1901, 1903; 118 (New Series), districts Prome and Sandoway, Seasons 1898–1901, 1903; 120 (New Series), district Heuzada and Sandoway, Seasons 1899–1900, 1903; 155 (New Series), district Magwe, Seasons 1893–94 and 1901–1902, 1903; 160 (Second Edition) (178 Old Series), parts of districts Prome and Thayetmyo, Seasons 1882–83 and 1898–1900, 1903; 193 (Preliminary Edition, New Series), districts Shwebo and Mandalay, Seasons 1892–93 and 1899–1900, 1902; 287 (Third Edition) (306 Old Series), parts of Mandalay district and Northern and Southern Shan States, Seasons 1895–97, 1903; 309 (328 Old Series), districts Pegu and Hauthawaddy, Seasons 1880–82, corrected to 1897, 1903; 440, 441 (New Series), and 443, Southern Shan States, Season 1901–1902, 1903. Degree Sheet 53, parts of the Northern and Southern Shan States, 1903.—Central India and Rajputana Survey, 1 mile to an inch. Sheets: 71, parts of Jodhpur (Rajputana Agency), Seasons 1878–79, corrections to boundaries to 1902, 1903; 292, parts of Jaipur and Tonk (Rajputana Agency), Season 1866–67, additions and corrections to August, 1901, 1903; 320, parts of Gwalior (C.I. Agency) and Jaipur and Karauli (Rajputana Agency), Seasons 1864–66, corrections to 1900, 1903; 321, parts of Gwalior (C.I. Agency) and of Jaipur and Kotah (Rajputana Agency), Season 1865–66, additions to December, 1902, 1903; 322, parts of Gwalior (C.I. Agency) and Kotah (Rajputana Agency), Seasons 1865–67, additions to December, 1902, 1903; 324, parts of Gwalior (C.I. Agency), Kotah and Jhalawar (Rajputana Agency), Season 1870–71, addition of railway, May, 1899, 1903; 325, parts of Kotah, Tonk, Jhalawar (Rajputana Agency) and Gwalior (C.I. Agency), Season 1872–73, additions to roads and railways to May, 1899, 1903; 326, parts of Tonk, Kotah (Rajputana Agency), and Gwalior (C.I. Agency), Season 1872–73, addition to railway to December, 1902, 1903; 343, parts of Gwalior (C.I. Agency) and of Karauli and Dholpur (Rajputana Agency), Seasons 1863–65, additions to roads and railways to September, 1902, 1903; 346, parts of Gwalior (C.I. Agency), Season 1864–67, additions to December, 1902, 1903; 364, parts of Gwalior (C.I. Agency) and Dholpur (Rajputana Agency), Seasons 1863–65, additions to roads and railways to September, 1902, 1903; 365, 366, 367, 368, 370, 371, and 398, part of Gwalior (C.I. Agency), Seasons 1861–62, 1863–64, 1869–71, additions to roads and railways to September, 1902, 1903; 384 and 399 (Second Edition), part of Gwalior and Datia (C.I. Agency), Season 1862–63, additions to roads and railways to September, 1902, 1903.—Central Provinces Survey, 1 mile to an inch. Sheet 107, district Jubbulpore, Season 1901–1902, 1903.—Madras Survey, 1 mile to an inch. Sheets: 73, parts of districts Tumkur and Chitaldroog (Mysore), Seasons 1878–79, additions and corrections to September 1896, 1903; 80, part of district Mysore (Mysore), Season 1884–85, additions and corrections to March, 1902.—Punjab Survey, 1 mile to an inch. Sheet 85, district Mianwali, Seasons 1874–75 and 1878–79, additions and corrections to railways and boundary to 1901, 1903.—Punjab and North-West Frontier Province Surveys, 1 mile to an inch. Sheet 56 (Second Edition), district

Kohat and Bannu (N.W.F.P.), district Mianwali (Punjab), Seasons 1874–75 and 1877–78, 1903.—Sind Survey, 1 mile to an inch. Sheet 58, districts Shikarpur and Upper Sind Frontier, Seasons 1899–1901, 1903.—United Provinces of Agra and Oudh Survey, 1 mile to an inch. Sheets: 61 and 62*a* (Preliminary Edition), district Jhansi, Seasons 1895–97, 1903; 149, districts Bara Banki, Gonda, and Fyzabad, Seasons 1863–69, additions and corrections to roads to 1896, 1903.—United Provinces of Agra and Oudh Survey, Central India and Rajputana Survey, 1 mile to an inch. Sheets: 39 (U.P.) and 380 (C.I. and Rajputana), parts of district Agra (U.P. of Agra and Oudh), and of States Dholpur (Rajputana Agency) and Gwalior (C.I. Agency), additions to roads, etc., to September, 1902, 1903; 39*a* (Second Edition) (U.S. of A. & O.), 385 (C.I. Agency), parts of States Gwalior, Datia, and Orchha (C.I. Agency), and district Jhansi (U.P. of A. & O.), Seasons 1856–57, 1859–60, and 1862–63, 1903.—North-Western Trans-Frontier, 2 miles to an inch. Sheets: 440, parts of Afghanistan and Waziristan, Season 1894–5, additions and corrections to roads, boundaries, and names to April, 1903; 441 (Second Edition), parts of Afghanistan, Kurram Valley, and Tirah, Season 1897–98, additions to roads to February, 1903; 442 (Second Edition), parts of Afghanistan and Waziristan, and part of districts Kohat and Bannu, Seasons 1879–83, 1894–95, and 1897, additions and corrections to roads and railways to September, 1902, 1903.—North-Western Trans-Frontier, 4 miles to an inch. Sheet 4 N.E., part of Persia, Seasons 1889, 1893–94, and 1899–1900, 1903.—North-Eastern Frontier, 4 miles to an inch. Sheets: 21 N.E., Tibet and China, Yunnan and Ssu-Chuan Provinces, Season 1899–1900, 1903; 23 N.W. (Ninth Edition), parts of districts Myitkyina, Upper Chindwin and Katha (Burma) and China (Yun-nan Province), Seasons 1885–93 and 1895–1900, 1903; 23, S.W. (Ninth Edition), parts of districts Bhamo, Myitkyina and Katha, and Northern Shan States (Burma), and China (Yun-nan Province), Seasons 1885–1892 and 1897–1900, 1903.—North-Eastern Trans-Frontier, 4 miles to an inch. Sheet 7 N.W. (Second Edition), parts of Sikkim, Tibet, and Bhutan, 1903.—South-Eastern Frontier, 4 miles to an inch. Sheet 4 N.E. (Eighth Edition), parts of Northern Shan States (Burma) and Yun-nan Province (China), Seasons 1894–95 and 1898–1900, 1903.—Index to the Standard Sheets of the North-Eastern and South-Eastern Frontier Series, 250 miles to an inch. *Presented by H.M. Secretary of State for India, through the India Office.*

Indo-China. **"Les Missions Catholiques."**

Carte des Missions Catholiques du Siam, de la Birmanie et du Laos. Scale 1:3,000,000 or 47·3 stat. miles to an inch. Supplement to *Les Missions Catholiques*, No. 1822. Paris, 1904.

Apart from the special purpose for which this map has been published of showing the progress of the Catholic missions in Burma, Siam, and Indo-China, it will be useful as a general map of those regions, as it contains a considerable amount of information. Residences of Catholic bishops and missionaries are indicated, and the limits of various bishoprics are clearly marked in red. The map accompanies *Les Missions Catholiques* for May 6, 1904.

Khotan. **Stein.**

Map showing portions of the territory of Khotan and adjoining regions. Surveyed under the direction, and with the assistance of M. A. Stein, PH.D., H.M.'s Indian Educational Service, by Sub-Surveyor S— R—, Survey of India Department, 1900–1901. Scale 1:506,880 or 8 stat. miles to an inch.

An account of Dr. M. A. Stein's explorations in Central Asia was published in the *Geographical Journal* for December, 1902, accompanied by a map prepared under his supervision from the surveys of the Indian surveyor who accompanied the expedition. Although this map was on a fairly large scale, and contained much detailed information, it has been considered advisable to prepare a larger one for the purpose of illustrating the final official report of this important expedition, and a copy of this has now been presented to this Society. It has been drawn by Mr. J. Addison, one of the Society's draughtsmen, from the map on the scale of 1:760,000, prepared in the Indian Survey Department, and from other material furnished by Dr. Stein, and printed in colours. Land under cultivation is shown in dark green, sandy track with shrub or jungle light green, and moving sands in yellow. Other important information is shown by various symbols.

Tibet. **Schmidt.**

Karte des mittleren Teiles von Süd-Tibet, nach den neuesten Quellen gezeichnet von C. Schmidt. Scale 1:2,000,000 or 31·5 stat. miles to an inch. *Petermanns Geographische Mitteilungen*, Jahrgang, 1904, Tafel 7. Gotha: Justus Perthes, 1904. *Presented by the Publisher.*

AFRICA.

Egypt. **Survey Department, Cairo.**

Topographical map of Gharbia Province. Scale 1 : 10,000 or 6·3 inches to one stat. mile. Sheets: N.E. 36–3, 40–1. Cairo: Survey Department, Public Works Ministry, 1904. *Presented by the Director-General, Survey Department, Cairo.*

Portuguese East Africa. **Companhia de Moçambique.**

Carta da região mineira de Manica levantada sob a direcção do Capitão d'Engª A. A. Freire d'Andrade, Companhia de Moçambique, 1900. Scale 1 : 100,000 or 6·3 inches to one stat. mile on 26 sheets, and 1 : 20,000 or 3·2 inches to one stat. mile on 4 sheets. Paris: A. Simon. *Presented by the Companhia de Moçambique.*

This map is on two scales, 1 : 10,000 and 1 : 20,000. The former, which consists of twenty-six sheets, shows the relief by contour-lines in brown at intervals of 10 metres, and the latter at 20-metre intervals combined with shading. Heights are also given in figures. Capt. d'Andrade is well known as a competent surveyor, and this map, which is based upon the trigonometrical and topographical surveys made under his direction, is further evidence of the high character of his work. It is the first attempt at anything like an exact survey of this region, and it is to be hoped that it may lead to other districts of Portuguese South-east Africa being properly surveyed. The area is limited to the mining district of Manica, and the mining properties are all clearly laid out.

South Africa. **Bartholomew.**

Central and South Africa. By J. G. Bartholomew, F.R.G.S. Scale 1 : 5,600,000 or 88·4 stat. miles to an inch. New and revised edition. Edinburgh: John Bartholomew & Co., 1904. *Price 3s. mounted in cloth. Presented by the Publishers.*

A new edition of this well-known and useful map of Central and South Africa, with revisions to boundaries, etc. In some respects it cannot be considered quite up to date, especially as regards physical features, and a thorough revision of the region between Lake Rudolf and Abyssinia is now necessary. The boundary between Uganda and British East Africa is not shown, and the name of the latter extends too far to the west, Uganda being made to appear as if it were a subordinate province.

Tunis. **Service Géographique de l'Armée, Paris.**

Tunisie. Scale 1 : 50,000 or 1·3 inch to a stat. mile. Sheet No. IV. Cap. Negro. Paris: Service Géographique de l'Armée. *Price 1.50 fr.*

AMERICA.

Canada. **Surveyor-General's Office, Ottawa.**

Sectional Map of Canada. Scale 1 : 190,080 or 3 stat. miles to an inch. Swan River sheet (21), West of Principal Meridian, revised to March 14, 1904; Saddle Lake sheet (72), West of Fourth Meridian, revised to April 12, 1904; Rosebud River sheet (76), West of Fourth Meridian, revised to March 5, 1904. Ottawa: Surveyor-General's Office, 1904. *Presented by the Surveyor-General of Canada.*

GENERAL.

World. **Darbishire and Stanford.**

The Autograph Hand-Maps: France, Spain, the Ægean, the Levant, the Mediterranean, the Nearer East, Asia, India, South Africa, British Columbia, Eastern Canada, Eastern Australia, New Zealand, the World on Mercator's Projection, the World on an Equal Area Projection. Oxford: Darbishire & Stanford. *Price 1d. each. Presented by the Publishers.*

These outline maps complete the series which was commenced some months ago, and the early issues of which were noticed in the *Geographical Journal* for November last. The maps vary considerably in merit, some being more roughly drawn than others, both as regards the projections and physical features. The world on Mercator's projection falls short of what it should be in several respects, and a somewhat serious mistake occurs in the marking of the degrees of latitude, the parallel that is evidently intended for 70° N. being marked as 80°. There is also room for improvement in the hill features, which in some cases quite fail to convey a correct idea of the relative heights. However, the maps will doubtless be useful as a basis upon which special features, such as the distribution of population, isobaric and isothermal lines, etc., can be readily shown. In several instances an outline of England and Wales is given on the same scale as the map for sake of comparison.

World. **Petrie and Schokalsky.**

Marcks' Large General Table Atlas. Edited by Prof. E. J. Petrie and Colonel J. de Schokalsky. Part 5. St. Petersburg: A. F. Marcks, 1904. [In Russian.] *Presented by the Publisher.*

This part contains maps Nos. 23 and 24, two sheets of a general map of European

Russia, scale 1:2,000,000; 31, German Empire, scale 1:2,750,000; 35, Bohemia, Moravia, and Silesia, scale 1:1,000,000; 39, Great Britain and Ireland, scale 1:2,750,000.

World. **Stieler.**

Neue, neunte Lieferungs—Ausgabe von Stielers Hand-Atlas, 100 Karten in Kupferstich. 31 and 32 Lieferung. Gotha: Justus Perthes.

These two parts are in one cover, and contain the following maps: No. 36, general map of the British Islands, scale 1:3,700,000; Nos. 53 and 54, sheets 3 and 4 of a map of the Balkan Peninsula, scale 1:1,500,000; No. 56, North and Central Asia, scale 1:20,000,000. The maps of the British Islands and North and Central Asia are new, the others are revised editions.

CHARTS.

North Atlantic and Mediterranean. **Meteorological Office.**

Pilot Chart of the North Atlantic and Mediterranean for June, 1904. London: Meteorological Office. *Price 6d. each. Presented by the Meteorological Office, London.*

United States Charts. **United States Hydrographic Office.**

Pilot Charts of the North Atlantic Ocean for May, and of the North Pacific Ocean for June, 1904. U.S. Hydrographic Office, Washington, D.C. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Argentine and Chili. **Streich.**

Album of thirty-three photographic reproductions of the country on the route of the Buenos Aires and Pacific Railway across the Andes from Buenos Aires to the Pacific, by Sr. Augusto Streich. *Presented by the Buenos Aires and Pacific Railway Company.*

(1) Government House and the Plaza de Mayo, Buenos Aires; (2) View in Palermo Park, Buenos Aires; (3) Transcontinental express of the Buenos Aires and Pacific Railway; (4) Restaurant car, Buenos Aires and Pacific Railway; (5) A typical "rancho" in the pampas; (6) Calle San Martin in summer, Mendoza; (7) Weighing and carting grapes in a Mendoza vineyard; (8) Transandine railway train, narrow gauge; (9) Tunnel on the Transandine railway; (10) Hotel and baths at Cacheuta; (11) Cerro de Plata, "Silver Range"; (12) Quebrada Seca, or the Dry Ravine; (13) River Mendoza; (14) El Paramillo de las Vacas; (15) The Tupungato peak; (16) "Los Penitentes;" (16) The Inca's bridge; (17–19) Hotel del Inca; (20) Valley of "Los Horcones;" (21) Aconcagua; (22) Valley of Las Cuevas; (23) Cerro de la Tolosa; (24) La Cumbre, the "Summit" of the pass and the frontier of both Republics, looking towards Argentina; (25) View on the Chilian side from the Summit pass; (26) Laguna del Inca; (27) The road at Juncallilo; (28) Valley of the river Aconcagua; (29) The present terminus of the Transandine railway on the Chilian side, Salto del Soldado; (30) The city of Valparaiso; (31) The public park of Santa Lucia, Santiago; (32) Congress House, Santiago; (33) The City of Concepcion, Chile.

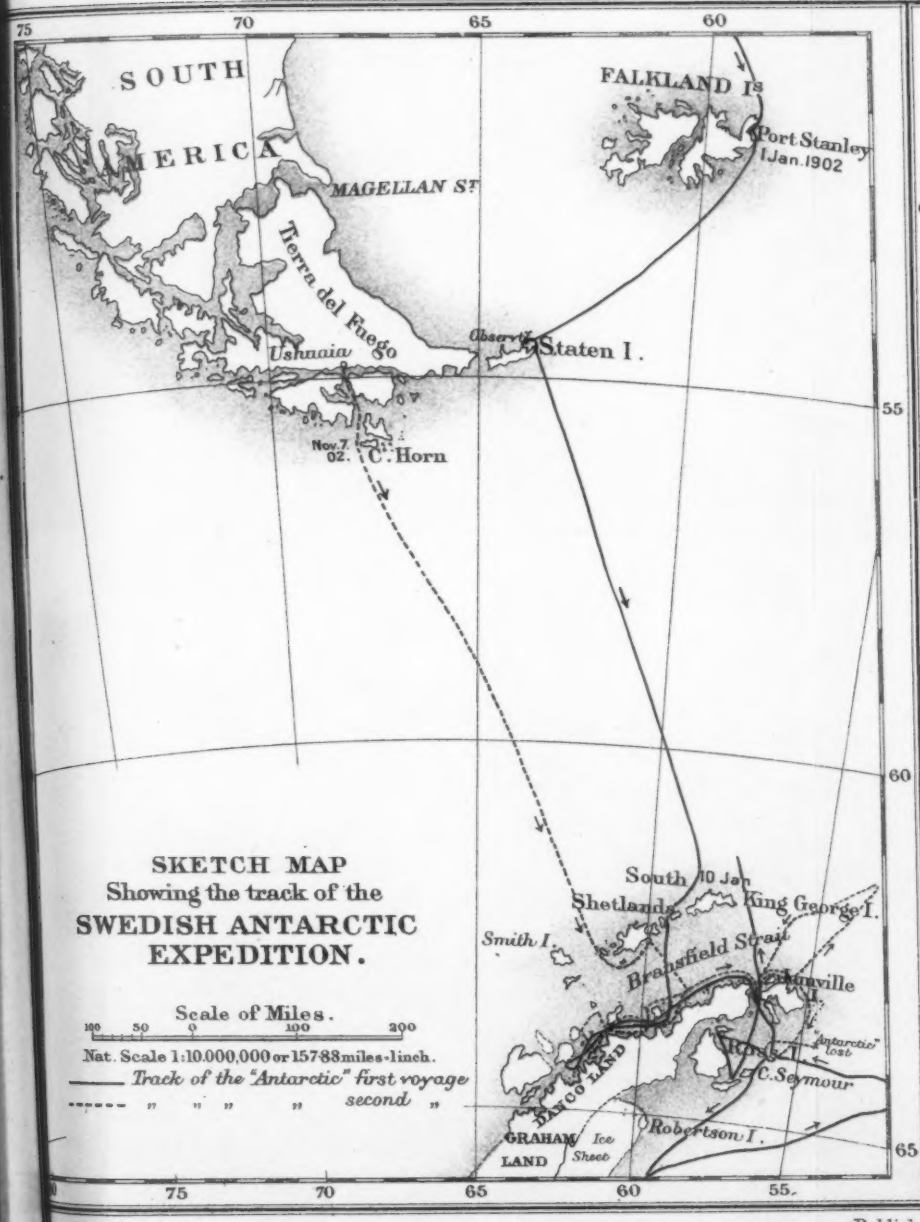
Morocco. **Vacher.**

Twenty-one photographs of Morocco, taken by E. P. Vacher, Esq., in 1904. *Presented by E. P. Vacher, Esq.*

These photographs were taken by Mr. Vacher during a visit to the country in January last. Eleven of them are of Morocco city, five of Mogodor, and the remainder of scenes *en route*. The following are the titles:—

(1) Morocco city; (2) The sultan's garden, Morocco city; (3) Market place, Morocco city; (4 and 5) Bazaar scene, Morocco city; (6) Portion of the wall which surrounds Morocco city; (7) Tower of a mosque, Morocco city; (8) Fountain and mosque tower, Morocco city; (9) Slave market, Morocco city; (10) Slaves on sale in slave market, Morocco city; (11) Gateway, dividing two parade grounds near sultan's palace, Morocco city; (12 and 13) Gateway in Mogador; (14) Main street, Mogador; (15) Two of the escort at Palm Tree House, Mogador; (16) Entrance to Palm Tree House; (17 and 18) The market-place, Mazagan; (19) Mid-day halt; (20) Camp in dismantled castle near Ileta; (21) Mr. Vacher's quarters for one night at Sheshasua.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.



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SWEDISH ANTARCTIC EXPEDITION.

NORDENSKIÖLD.

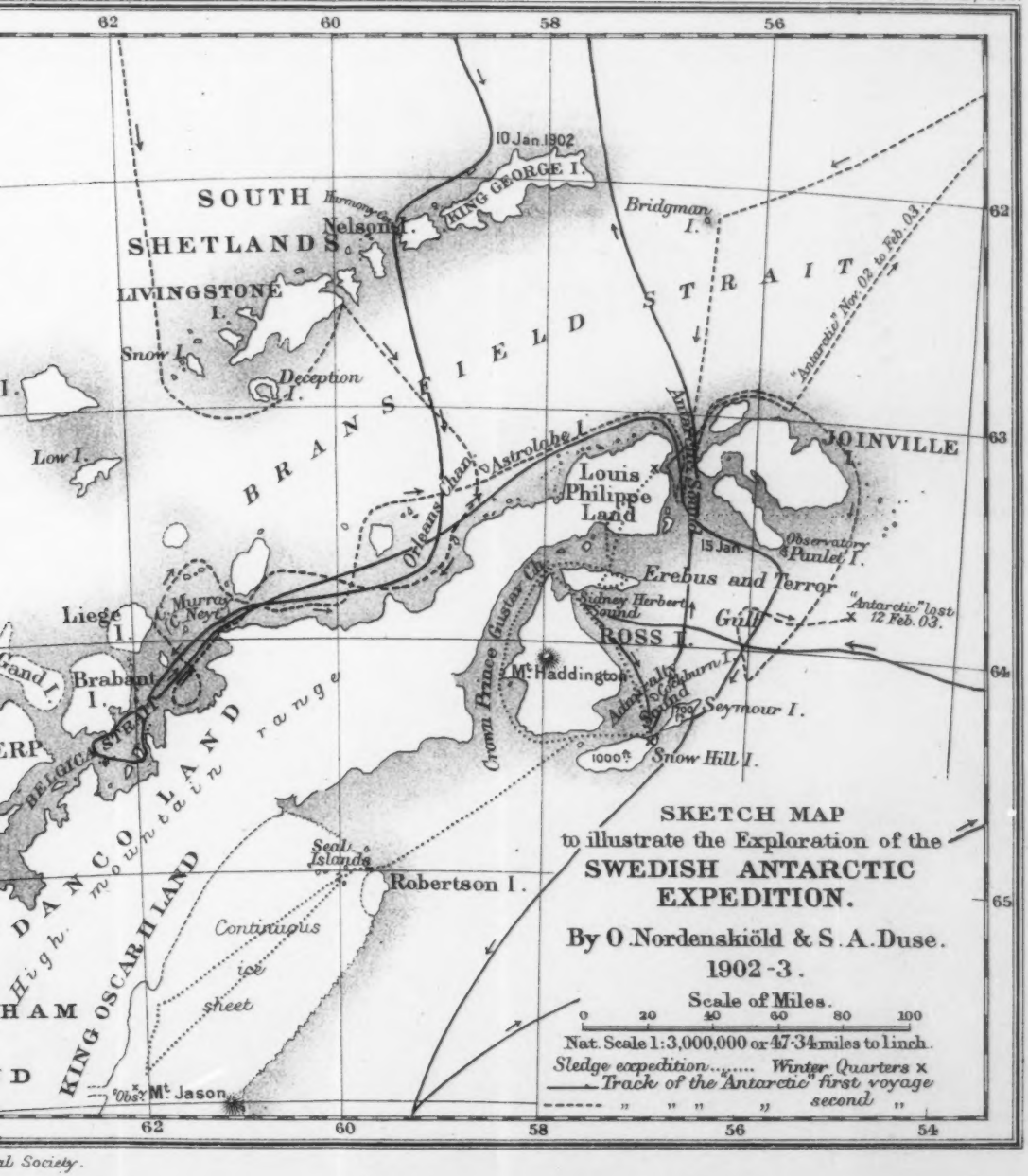

PLATE I

5'49' 5'48' 5'47' 5'46' 5'45'

56°58'

56°57'

56°56'

Loch a' Ghille Ghobaich

Beoraidbeg

Beoraidmore

Morar Station

Cnoc na Drochaid

River Morar

Rhubana

Eilean Ruadh

Kinsadel

Lochan a' Chleirich

Allt Coire Carrach

Blàr na Caillich Buidhe

Tòrran nam Meirleach

Druim Dubh

Allt Lochan a' Ghlinne

Tòrr na Bà

Island Morar

Rudha Bàn

Eilean a' Mheadhoin

Eilean a' Phidhir

Eilean nam Breac

Camas Ruadh

Rudha Garbh

Rudha Port na Coite

R. C. School

Lochan Uaine

Cruach Choireach

Loch na Fearna

Coire na Fearna

Loch na Bà Glaise

Ridhe Samhrach

Allt nan Seic Aosmhan

Allt Fraoch

Allt Breac

Braeriach

Rudha Ard Camais

Retland Lodge

Beinn a' Bheurraidh

Allt an Eas Bhàin

Scamadale

Allt Lochan a' Ghlasdail

Waterfall

Spidir nan Caorach

Retland Burn

Allt an Fhaing

Lochan na Crumbie

Carn a' Bhàdaich-ruaidh

Lochan na Bà Glaise

CROSS SECTION

C D

100 200 300 400 500 600 700

712

A

100 200 300 400 500 600 700 800 900 1000

The Edinburgh Geographical Institute

BATHYMETRICAL SURVEY OF THE FRESH-

UNDER THE DIRECTION OF

SIR JOHN MURRAY, K.C.B., F.R.S., D.Sc., AND LA

5°44' 5°43' 5°42' 5°41' 5°40'

L O C H

N O R T H

S O U T H

Ardintigh Bay

Tòrr a' Chonnaidh

Lochan Stole

Drain D. Beglach na Saige

Lochan nan Uan

Innis Riabhach

Allt an Sionnach

Creag nan Clachan

Ford

Lochan Innis Eanruig

Lochan Ròpach

Lochan a' Chuirn Duibh

Allt an Inbhire Bhig

Allt an Inbhire Dharaidh

Monadh na Sròine Duibhe

Creag Mhòr Bhrinacora

Druchag Dhòghaill

Lochan nan Tri-shrònan

Loch a' Bhòghaid

Inbhir Beag

Rudha Dubh

Sròn Dubh

Allt a' Bhaiteadaidh

Brinacory Burn

Gushine Loch

Coir' an Fheòrna

Cnoc an Dòin

Camas na Togalach

Wester Brinacory

Tòrr an Tuirc

Easter Brinacory

Brinacory Island

Allt na Sguir Gruidear

Glac Mhòr

Rudha nam Fasaichean

Lettermorar

Cnoc Allmha

Eilean Allmhara

Coille Allmhara

Allt Lochan Feith a' Mhadaidh

Allt na Sgeilg

Allt Lochan a' Ghlaisaich

Coille Poll nan Uisgeanan

Lochan a' Ghlaisaich

NOTE TO SECTIONS

Scale of Length 3 inches = 1 Mile same as in M

The Black Part in the Section on the same Scale ; the

shows the Section with Depths exaggerated 5 t

5°44' 5°43' 5°42' 5°41' 5°40'

LONGITUDINAL SECTION ALONG AXIS

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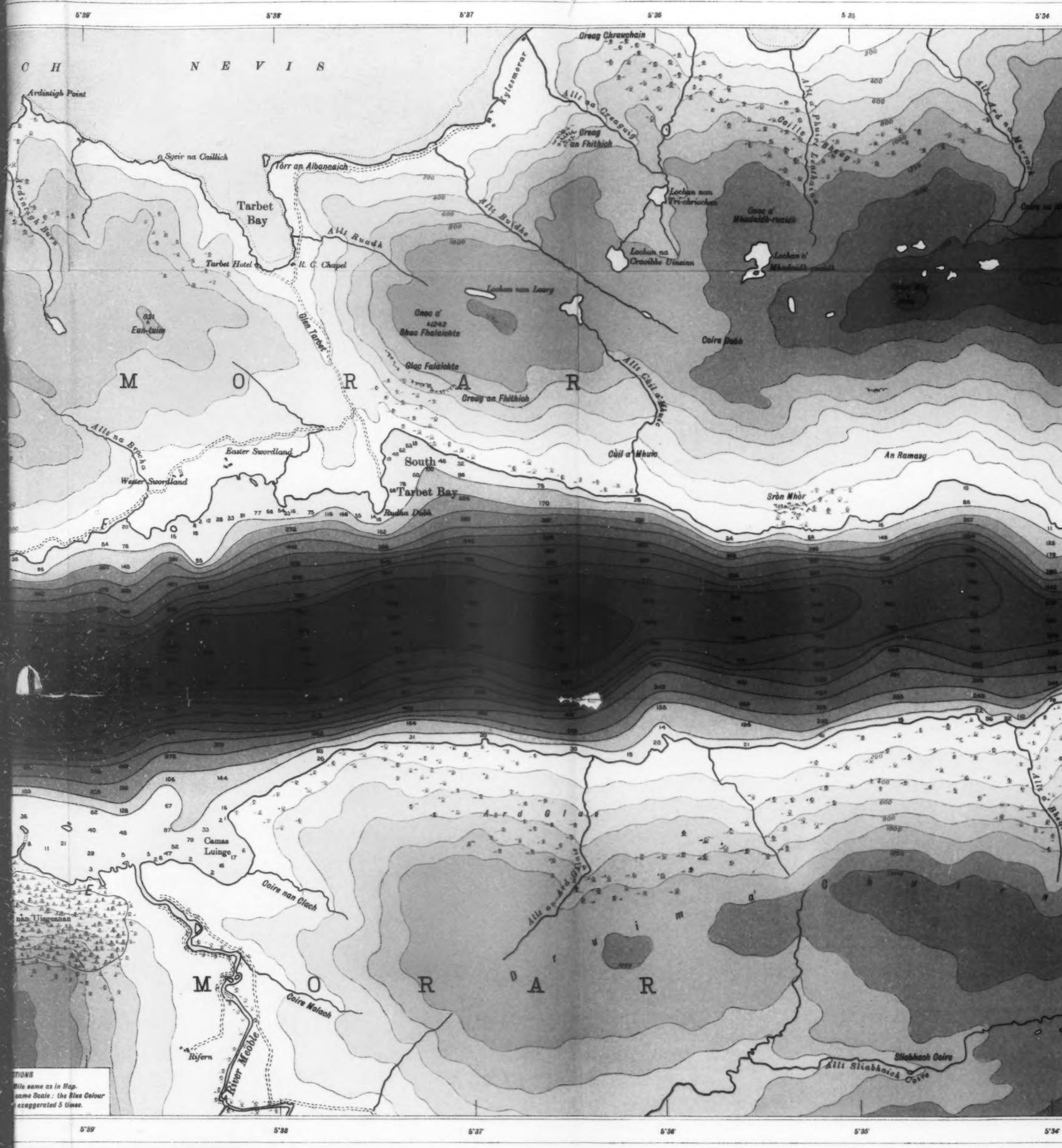
RESH-WATER LOCHS OF SCOTLAND

ECTION OF

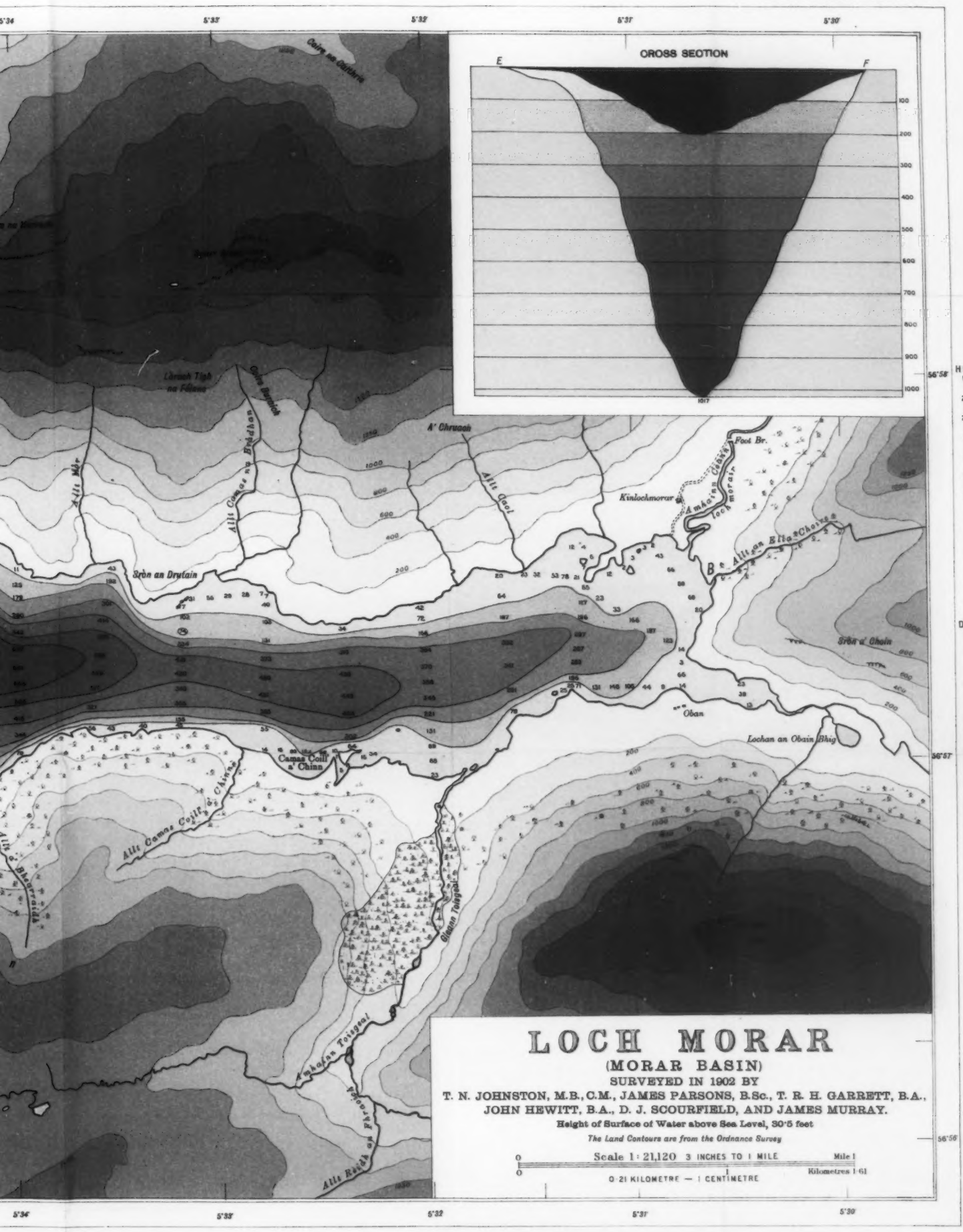
., AND LAURENCE PULLAR, F.R.S.E.

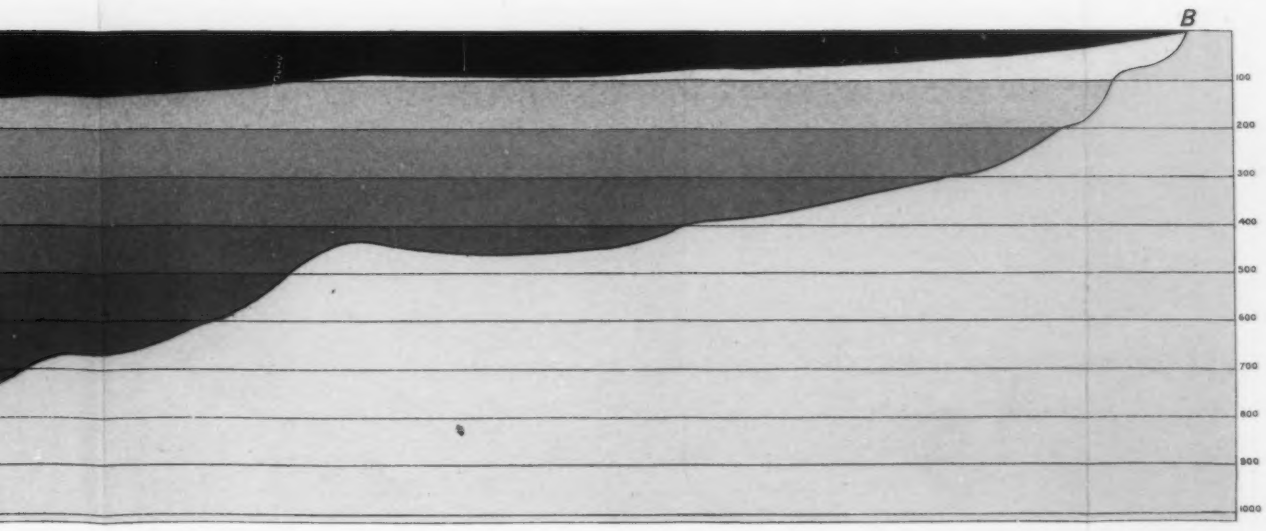


TIONS
Mile same as in Map.
same Scale: the Blue Colour
exaggerated 5 times.

G AXIS OF MAXIMUM DEPTH

graphical Society.





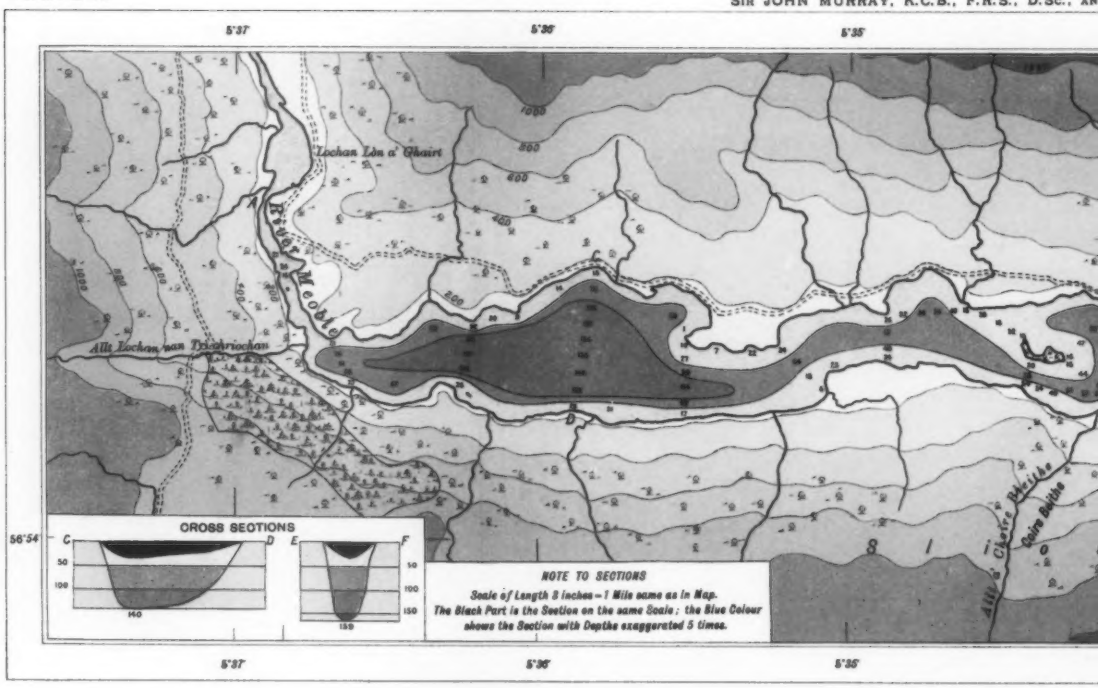
J. G. Bartholomew.

BATHYMETRICAL SURVEY OF THE FRES

UNDER THE DIRECTIO

SIR JOHN MURRAY, K.C.B., F.R.S., D.Sc., AN

PLATE II



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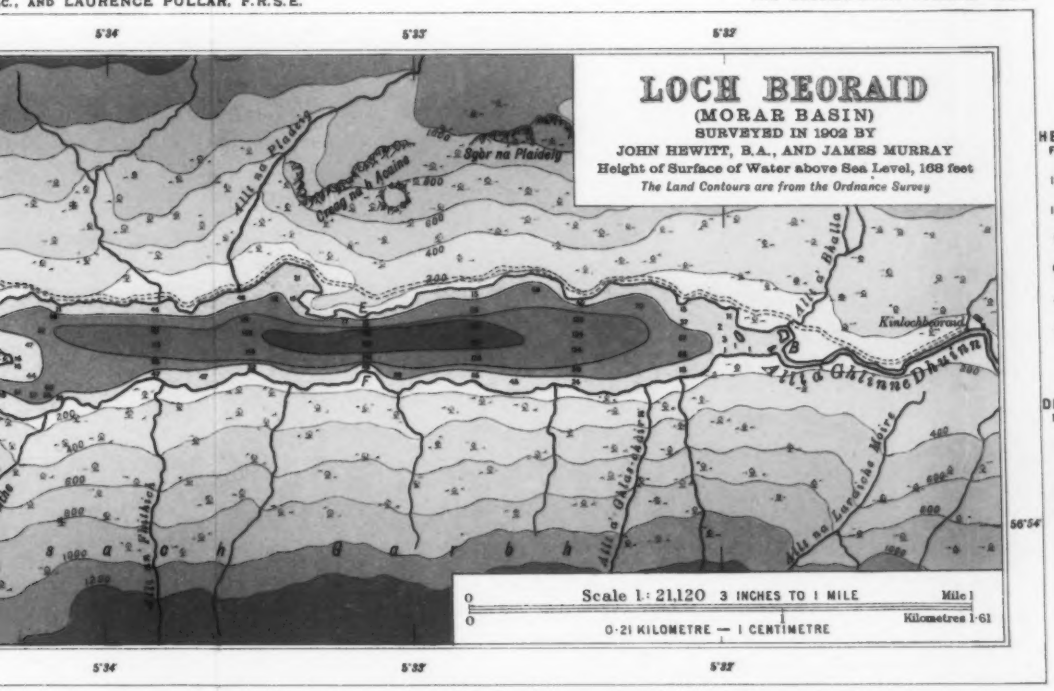
FRESH-WATER LOCHS OF SCOTLAND

IRECTION OF
C., AND LAURENCE PULLAR, F.R.S.E.



HEIGHTS IN FEET

FEET	METRES
1250	381·1
1000	304·8
800	243·8
600	182·9
400	121·9
200	61

DEPTHS IN FEET

FEET	METRES
50	15·2
100	30·5
150	45·7

NG AXIS OF MAXIMUM DEPTH

l Geographical Society.

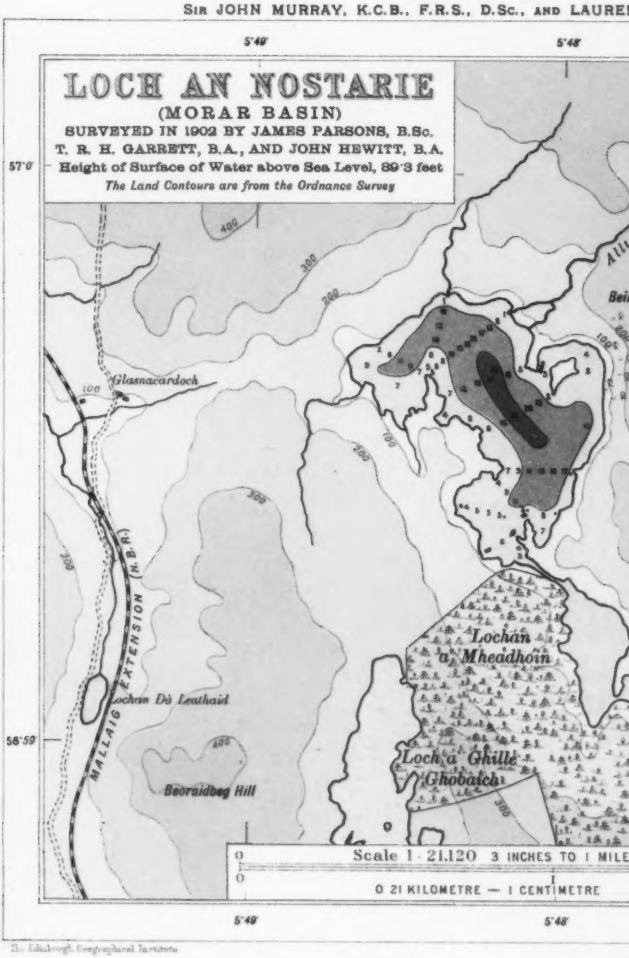
J.G.Bartholomew

PLATE III

BATHYMETRICAL SURVEY OF THE FRESH-WAT

UNDER THE DIRECTION OF

SIR JOHN MURRAY, K.C.B., F.R.S., D.Sc., AND LAUREL



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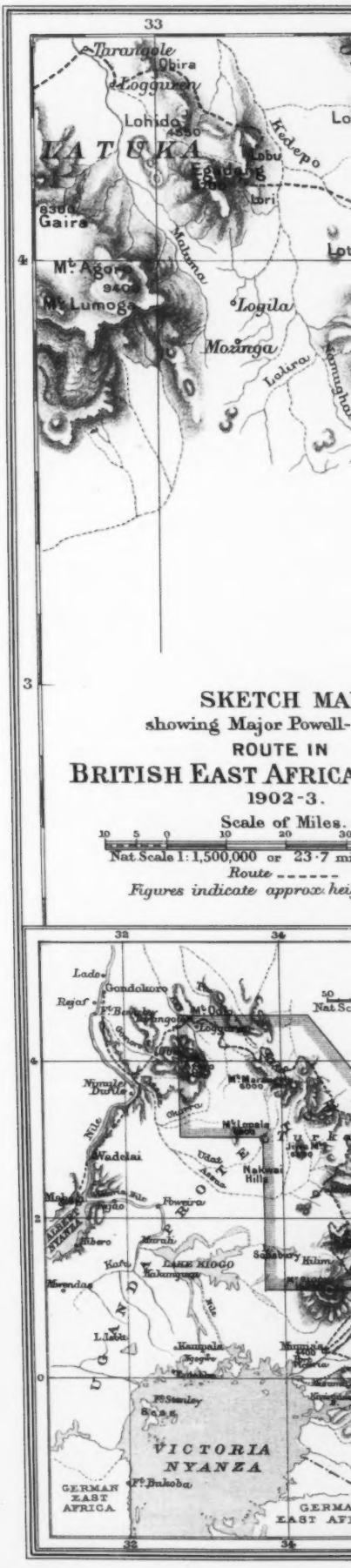
WATER LOCHS OF SCOTLAND

AURENCE PULLAR, F.R.S.E.

J. G. Bartholomew.


33
Tarangole
Obira
Loggwero
Lohido
4350
LATUKA
Lobu
Kedepo
Lori
6300
Gairo
Mt. Agoro
9400
Mt. Lumoga
Logila
Mozinga
Lolira
4
3
SKETCH MA
showing Major Powell-
ROUTE IN
BRITISH EAST AFRICA
1902-3.
Scale of Miles.
10 5 0 10 20
Nat. Scale 1: 1,500,000 or 23·7 m
Route ------
Figures indicate approx. hei
32
34
Lado
Gondokoro
Rejaf
Mt. Ogo
Nimule
Mt. Mer
8000
Mt. Lonsia
Wadelai
Nakwai Hills
Mahagi
Pawara
Albert
Nyanza
Albert
Nyanza
Ribero
Marah
Kafu
LAKE KIOGO
Kakungura
Mwondus
Kampala
Mumia's
Fort Stanley
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Fort Bukoba
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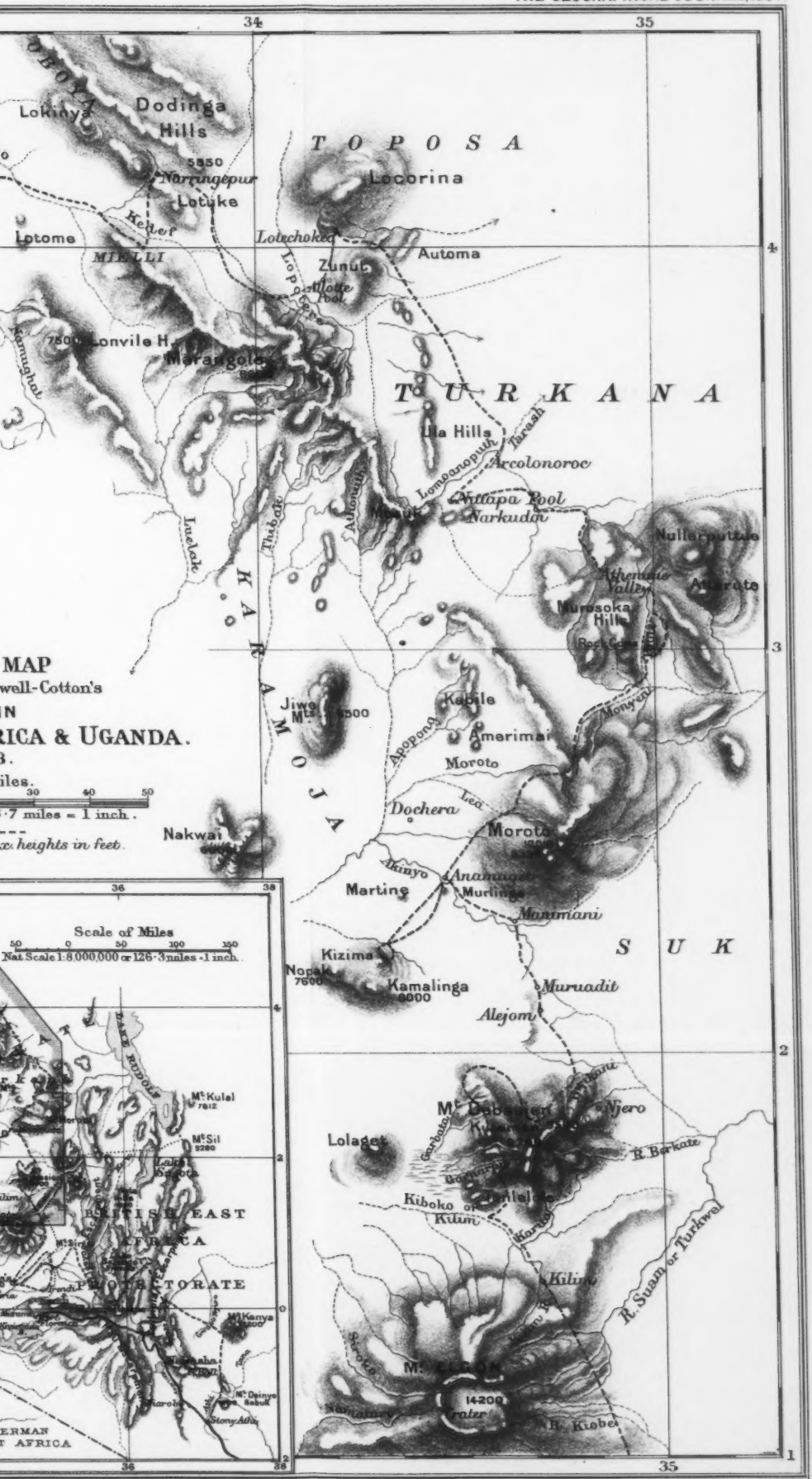

MAP
Powell-Cotton's
IN
RICA & UGANDA.
3.
iles.
30 40 50
·7 miles = 1 inch.
x. heights in feet.

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2

AUGUST, 1904. VOL. XXIV. No. 2.

The Geographical Journal

INCLUDING THE PROCEEDINGS OF THE ROYAL GEOGRAPHICAL SOCIETY.

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For Notices as to the Society's Meetings and other important matters see p. iv.